



Shopping Around

Goofy and Pluto learn about terminals from Courier representative.

End Users Reap New Products Bonus System Replaces 270X-Type Units

By Ronald A. Frank
Of the CW Staff

ANAHEIM — The FJCC's communications and terminals committee job — to develop a specifically tailored to meet the problems of users. In most cases the specialized products stressed improved cost/performance features.

Several products combined previously separated into two separate jobs — the operator included in this group was the Parallel Interface Extender (Pxe) system from Paradyne Corp., which replaces IBM 360/370 270X-type line controllers in addition to terminal and monitor functions.

Northern Telecom, a subsidiary of Northern Electric Co. of Canada, showed its low-cost Logic 16 data input set that combines the functions of a Touch-Tone telephone with an acoustic coupler and a 16 character numeric display.

Designed for telephone company and credit card verifications, the device allows an operator to enter a customer's account number into the display before transmitting the data through the coupler to an audio-response equipped CPU. The numeric data can be entered in local mode and edited as required before the call is placed.

Northern Telecom has scheduled first

(Continued on Page 2)

Floppy Disk Heart Of Data Entry Unit

By Michael Weinstein
Of the CW Staff

ANAHEIM — Cost breakthroughs, new applications and the general proliferation of application-oriented systems made the Fall Joint Computer Conference a show with new products introduced to solve specific and costly applications.

Effective use of floppy disk drives by Potter Electronics' DDS 1073 data station offers a logical disk replacement for card punch data entry operations, according to the company.

The basic data entry system is a combination of three integrated sub-systems: DDS 1073 data board with a 500K byte disk, a keyboard and a 132 line/min printer and lightweight plastic floppy disk storage unit.

The heart of the system is the eight-inch floppy disk which is loaded into the memory disk system through a sealing slot. Once the disk is inserted it automatically aligns the disk for recording operation, the firm stated.

Each 54 disk unit has a capacity of around 650K bits of information.

Once the disk is inserted, data is input by an operator from the keyboard or under automatic keyboard control with optional switching from program to program, a Potter spokesman stated.

Editing capabilities include search by record, search by id number, search by track or sector.

Visual display and output for the unit is the Potter LP3000 printer which operates at 135 line/min.

Once the disk has entered the data on the disk and is ready for processing there are three ways to transmit the data to the central computing facility.

The standard method is via the mail with a printer-produced hard copy attached for verification.

A second method is an option to the basic system converter for transferring

(Continued on Page 2)

On the Inside

Evaluate the Options
Before Optimizing OS — Page 10

Electronic Transactions
Can Cut Banks Paper Jams — Page 12

Communications 27

Computer Industry 37

Editorial 20

Financial 53

Software/Services 25

Systems/Peripherals 33

December 13, 1972

Vol. VI No. 50

Revamped Last Joint Gives User, Planner New Promise

By Edward J. Bride
and E. Drake Lundell Jr.
Of the CW Staff

ANAHEIM — The last sessions have been passed, and the right road has been taken.

Most of the planners and attendees of last week's Fall Joint Computer Conference used various words to express that conclusion but they all pointed to the increased emphasis on user topics, with half the program devoted to the need of computer technology, the move into vertical sessions aimed at specific markets and the switch of site to Anaheim.

Last May, the show sponsor, the American Federation of Information Processing Societies, said it was time to move the show to a more central location, including the possibility of changing the format to only one conference a year. That decision was made a few weeks later, and this fall conference was seen by many people as the transition.

Users and computer industry representatives had

an assortment of 60 sessions to attend, including four all-day seminars for users in specific industries. These sessions had no technical sessions, and evening sessions on varied topics, from privacy to history, were well-attended.

Users also got a wide-ranging education on hardware, as more new products were introduced than at recent JCCs. The preponderance was in communications and data entry or preparation devices; while the large mainframes were again absent from the exhibit floor.

Last figures showed that over 20,000 people attended the meeting, an increase over last fall's total of just under 17,000.

Exhibit space was sold out. Afips continually struggled, with 165 organizations filling 410 booths. Two booths were removed from the original layout because supporting columns in the Anaheim Convention Center made it impossible or inconvenient for some exhibitors to set up.

The attendance was given to the IEEE Computer Society and to the Restors, a student group studying computers.

On the technical program side of the show, the move into vertical sessions got high marks from most attendees, but the most popular technical program drew a mixed reaction.

The sessions devoted to banking, medicine, manufacturing and information data centers were considered well run and informative, though shorthanded — and they also drew good crowds.

The banking session in particular was singled out by users and top management in banks for its organization and content, and the manufacturing received much the same type of reaction.

(Continued on page 6)



John Potter demonstrates Potter's DDS 1073 data entry system for the press.

Challenge Issued

DPers 'Fail' Social Role

By E. Drake Lundell Jr.
Of the CW Staff

ANAHEIM — Computer people have traditionally failed as social activists. John Rigo, a Rigo Associates vice-president at Barker Trust Co., indicated as much here last week in a speech challenging computer people to make a greater effort to carry through projects for the larger society.

Rigo, speaking at a meeting of the ACM Special Interest Group on Computerized Society, noted in the past eight years there have been five great social movements: civil rights, antinuclear, antipollution, environmentalism and feminism.

In each of these cases, he noted, there has been initial interest by DPers which then subsided somewhat into a "more sustainable" position in society at large.

"Each stirred up computer people wanting to do something for society," he said. "The problem is that we are the general 'full-time-their-life' DP person who held a part-time job, but who wanted to make some larger contribution to society. 'We look for some way to help change the world, but we feel better for other people's success than our own lives in the process,'" he said.

But on the whole, he added, after the initial enthusiasm for the new cause

passes the computer people fade from the scene when the hard work begins.

One of the problems, he said, was that computer people by their nature couldn't address many of the issues at hand and would have to join with other organizations to accomplish their objectives.

Another problem was that most of the people with whom computer people must interact are lawyers who can only think in terms of legislation or litigation to help solve the social problems.

Another problem, he noted, was that computer people often weren't experts in the areas that were of concern to the public. "We are not the social experts, the social issues, and the organizations often didn't want to have amateurs helping them."

This leads to another problem — often computer people sold socially active groups and companies computer projects, but when the time came for the hard work to implement the plan, the computer experts often disappeared.

But, nevertheless, "it is time for our community and social organizations to learn how to pool professional skills to solve social problems. People who are experts in one field can learn from those who are expert in data processing or some other field to develop solutions that neither could find alone," Rigo stated.

Controllers, Modems, Terminals Emphasize Price/Performance

(Continued from Page 1)

U.S. deliveries of the Logic 16 for the second quarter of 1973 are put at \$250. The LED display is powered through a transformer from a 110 volt source, but battery power may be included in later models, a spokesman said.

Northern Telecom also showed an "all-digital" modem which uses conditioned dipulse modulation techniques. Essentially, the method requires no carrier frequency and it can operate at speeds from 2,400 to 19,200 bits/sec. The unit is priced at \$900 with alarm and supervisory options. The data set will be available in the first quarter of 1973. Northern Telecom is at 140 Federal St. in Boston.

Remote Capabilities

The Paradyne Pix interface works with most IBM printers and card readers and provides users with a remote communications capability that connects directly into a 360 or 370 multiplexer channel over dial-up or private lines. Since the Pix system includes line control and error control synchronous and asynchronous modes for telecommunications access methods such as Btam, the system allows the user's main CPU to transmit data to remote sites equipped with card reader/printer combinations using the same software that is used to communicate with "local unit record peripherals," Paradyne said.

The Pix system includes a control unit which can accommodate up to 16 half-duplex or full-duplex remote modules. The control unit emulates the IBM 2812 Card/Print Control Unit which is supported with standard software, Paradyne said.

The communications system can be used with 360 and 370 CPUs and the IBM

1403 printer, 2540 card reader, and similar equipment.

The system interfaces with one high speed position on the CPU multiplexer channel. A typical system of one control unit with one line module costs \$400/mo without data compression. Additional line modules cost \$250 each and data compression adds \$150/mo. A remote Pix capability costs \$250/mo/channel. Deliveries are expected in the first quarter of 1973.

Centronics introduced its 401 CRT display terminal which can display up to 132 characters in 3 x 5 by 80 character areas which is equivalent to 10-point type, the company said. The CRT can transmit at 4,800 bit/sec using the 63-character Asci set.

Five key-selected data flow paths are available to the operator and the cursor is controlled by seven keys so that selecting editing is possible, the company said. The CRT costs \$1,495 and is available for 30 day delivery.

Typeyne Corp. showed its Model 38 TTIV with an adding machine cluster that will be available in the first quarter of 1973. The feature adds \$38/mo to the 10 character terminal and a special card reader. Device Inc. introduced an APL portable thermal-printing terminal available with either Asci or IBM 2741 character sets.

Multics compatible keyboard and costs \$3,100 with additional costs for specific terminals ranging from \$125 to \$300 for IBM APL/Asci capability. First deliveries of the device are scheduled for early next year.

Cora Data introduced an acoustic coupler specifically designed for Model 33 TTY users. The Bell 103 acoustic coupler provides indicator and switch selectable full- or half-duplex operation. It is priced at \$147 with a Model 33-type connector for installation by the user, the company said.



Index: Keyscan System combines OCR and key-to-disk technology.



OW Photos by V.J. Fenner

Data Products' Chambard Print Train

Printer, Tape Drives Offered

(Continued from Page 1)

data to IBM-compatible tape. This unit has a flexible disk drive and produces IBM-compatible tape in 1,600 bit/in. PE tape with a read/write speed of 100 in./sec.

A third alternative is the Potter 6780 asynchronous modem - costing \$4,650 - which can be attached for direct on-line data transmission.

A basic data station - keyboard, printer, and floppy disk recording unit - costs about \$7,500, including PE tape.

The firm is located at 522 Broad Hollow Road, Melville, N.Y. 11746.

New Print Train

Data Products introduced a new high speed print train featuring a different concept in print trains which the firm said will reduce the most common printer maintenance problem - friction wear on the train itself.

The Charabard print train mounts on the 2550 printer so that when viewed from the front it looks like a tank tread with the print train assembly on either side of the thin edge of the band.

By revolving the bank in this manner there is no sliding friction as elements move around the spindles, a spokesman said.

Further, since character slugs are placed on both sides of the band it is possible with standard 48 character set models, the user has a choice of two speeds 1,200 line/min for OCR quality printing, and 1,500 line/min for standard hard copy output, the spokesman continued.

First deliveries are expected in June 1973, priced around \$40,000 from D219 First Ave., Woodland Hills, Calif. 91364.

Document Processor

Infoxel unveiled a system for users who process invoices against checks. The system is based on a marriage of Optical Character Recognition (OCR) technology and the key-to-disk entry technology employed in their 1301 and 1302 key entry data.

The Keyscan system is used to relate the information coming in on bills and vouchers against the customer's check for services.

The system optically scans numeric data from the voucher and enters the data - in MICR coding - on the check.

As each individual check is verified against the billing voucher information is also sent to a central unit for storage, creating a permanent record of all transactions.

The Keyscan system will be available for installation in the second quarter of 1973. Rental cost for the basic system control facility - Model 1380 Control Unit and 1282 Supervisor's Station - is \$14,000. The Keyscan unit is \$300/mo which includes maintenance from the firm at 21 North Ave., Burling-ton, Mass. 01803.

Computer Machinery Corp. (CMC) unveiled what it claims is the largest data entry system available to the end user.

The CMC system can handle up to 64 keystations with 29M bytes of intermediate disk storage. Individual keystations can be either panel display units

or high production work or video display units for verification, a spokesman stated.

A system with a keyboard and monitor operation using a video display unit and hard copy audit trails. The unit is designed to communicate with remote terminals, other data entry systems or IBM systems via communications lines, he noted.

Basic system configuration is a 29M byte 2314-type disk subsystem, magnetic tape unit, supervisory video display unit, 135 line/min printer and a PDF-11 mini-computer.

Lease price for the system is \$2,800/mo plus \$700 for each keystation from 100 Wilshire Blvd., Santa Monica Calif. 90401.

MDS Tape System

Mohawk Data Sciences Corp. will offer users a family of magnetic tape subsystems as a replacement for IBM 3470 tape drives.

The MDS computer tape subsystems are compatible with IBM's System 3, 360 and 370, and are also compatible with other IBM subsystems, the firm's spokesman stated.

The product group consists of an 8410 tape drive, and an 8410 tape read and controller. Each is available in a choice of three configurations: Model 2, with a tape read/write speed of 25 in./sec; Model 3, at 50 in./sec; and Model 4, at 75 in./sec.

The Model 2 has a transfer rate of 40 Kbyte/sec and row speed of 250 in./sec. Model 3 performs at 80 Kbyte/sec and 250 in./sec; and Model 4 transfers at 20 Kbyte/sec and 500 in./sec.

The units will cost from \$180 to \$270/mo, about 10% lower than IBM counterparts, according to Mohawk in Herkimer, N.Y.

The Randomex exhibit was highlighted by a new unit for cleaning disk platters.

The portable Model 335 - a little larger than the proverbial breadbox - cleans 336-, 236- and 1316-type packs, the firm stated.

Brush assemblies perform the actual cleaning and resemble a read head in operation as they brush over the surface of each disk.

Brushes are rinsed and re-soaked with filtered solution before each cleaning pass, the firm said.

Priced at \$3,750 it is available from 27303 Warrior Drive, Palos Verdes Peninsula, Calif. 90274.

Amplex combined two IBM-replacement computer tape drives in a single compact cabinet to reduce users' floor space requirements by 50%, according to the firm.

The package contains two Amplex TM-34 tape drives in the same space required for a single IBM 3420 or equivalent tape drive. The TM-34 is priced as a single drive last year, a price an average of 15% below the IBM 3420, according to Amplex. It is available both singly and in the twin configuration.

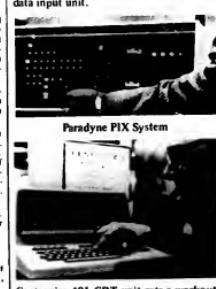
A spokesman said the twin TM-34 package requires 6.25 square feet, including maintenance.

Two Amplex Model TM-34s are available at a two-year lease rate of \$7850, including maintenance, or at \$35,000 purchase price.



OW Photo by Ronald A. Frank

Suzanne Engles demonstrates credit verification with Northern Telecom Logic 16 data input unit.



Paradyne PIX System

Centronics 401 CRT unit gets a workout.

COMPUTERWORLD
THE NEWSLETTER OF COMPUTER HARDWARE

TM Reg. U.S. Pat. Off.

ROBERT M. PATTERSON, executive editor
J.V. FARMER, news editor **RONALD F. FREY, hardware editor** **RONALD L. LARKE, JR., computer industry editor**
DONALD LEAVITT, software editor **EDWARD L. LEVINE, systems editor** **JOHN M. UPTON, MICHAEL WEINSTEIN, staff writers**
MARVIN ARONSON, LESLIE FLANAGAN, copy editor **PATRICIA M. GUAVERO, managing editor** **MARGUERITE Y. ZIENTARA, editorial assist. units**

ALAN TAYLOR, DANIEL COUGER, DAVID J. FERGUSON, FRANK GREENWOOD, columnists

J.H. BONNETT, European bureau

NEAL WILDER, national sales manager **DOROTHY STACEY, sales administrator** **PRANCES BLACKLER, customer relations**

LESTER ROTSTEIN, production manager **HENRY FLING, production supervisor**

EDITORIAL OFFICES 797 Washington St., Newton, Mass. 02160. Phone (617) 332-5460. 1000-1010 E. 31st St., New York, N.Y. 10016. 1000 E. 31st St., London, W.C.1, England 01-742-8908.

Second class postage paid at Boston, Mass. and additional mailing offices. Published weekly (except a single column in the second and third week of January) by Computerworld, Inc., 797 Washington Street, Newton, Mass. 02160. © 1972 by Computerworld, Inc.

Reproduction of material appearing in Computerworld is strictly forbidden without written permission. Send all requests to publication manager.

25 cents a copy; \$9 a year in the U.S.; \$10 a year in Canada; all other foreign, \$25 a year. **MARGARET PHelan, circulation manager**. Postage paid at Boston, Mass. 02160. For change of address, address all subscription correspondence to circulation manager, Computerworld, 797 Washington St., Newton, Mass. 02160.

W. WALTER BOYD, publication manager **PATRICK J. MCGOVERN, publisher**

BPA

IFP

AIA

POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 797 Washington St., Newton, Mass. 02160.

Multiprocessors Emerging

Multiple Minis Meaningful for Message Movement

By Ronald A. Frank

Of the CW Staff

ANAHEIM — Multiprocessor systems using multiple CPUs, operating in parallel, are being developed experimentally at several universities and research centers, according to participants at an FJCC session on distributed computing. The concepts in these systems will impact heavily on commercial resource sharing systems, participants agreed.

The multiprocessor system based on interconnected minicomputers now appears to be feasible, according to William A. Wulf from Carnegie-Mellon University (CMU).

Raise Questions

Such systems raise questions concerning the "unknown problems of dividing tasks into subtasks to be executed in parallel," Wulf said.

In a multiprocessor system, each processor is actually a complete CPU with its own local primary memory and controllers for secondary memories and devices, Wulf said.

One multiprocessor system being configured at Carnegie-Mellon joins 16 DEC PDP-11s into a 32 Mbyte system for the real-time analysis of speech data, Wulf explained.

While little is known about multipro-

Museum Art Works on File

FAYETTEVILLE, Ark. — The University of Arkansas here will serve as headquarters for a project aimed at establishing a uniform computerized museum data bank system.

At least 20 museums have computerized systems for cataloging data on their collections, and there are five major exchange systems in operation, said Robert Chernhall, executive director of the Museum Data Bank Coordinating Committee.

He said the committee plans to set minimal standard recording conventions for all museum data banks to facilitate the exchange of information.

His committee will also serve as a central office where potential users can obtain information on setting up their own systems.

The ultimate goal is the establishment of a nationwide network for the exchange of museum data, he added.



J.M. McQuillan

By Ronald A. Frank
William A. Wulf

osing structures and how to implement them, researchers believe these systems will become increasingly important as resource sharing networks become available to commercial users.

One of the critical operating points in multiprocessor systems occurs at the processor-memory interconnection (switch) point, Wulf said.

Peter Freeman from the University of California described a system with 16 memory modules interconnected to 16 processor ports using a 74-bit cross-point switch. The system analyzes artificial intelligence and uses PDP-10s.

Expensive Toys

"These networks can be very expensive toys for researchers, but they will also have to be cost-effective tools for commercial users," Ed K. Bowden Sr., University of Illinois, cautioned the session participants.

"Every installation manager who offers contract or demand services" should be able to transfer his jobs to another processor when his CPU breaks down, Bowden said. "This is where network computers come in."

The user "could not care less" whose resources he is using as long as he gets the best possible service at the lowest possible

price, he added.

In a discussion of the largest resource sharing system yet in operation — the Advanced Research Projects Agency (Arpa) network — Mark McNamee of Bolt, Beranek and Newman Inc. said under "heavy load" throughput on the Arpa network was "degraded significantly."

When Arpa messages arrive at a destination Interface Message Processor (imp), faster than they can be sent to the host CPU, "reassemble congestion" occurs, McNamee said. This leads to "reassemble lockup" in which the destination IMP is "incapable of passing any traffic to its hosts," he added.

With 10 or more links in use on the Arpa net with multipacket messages, "reassemble lockup occurs almost immediately," McNamee said. The combination of a buffer stage at both the source and destination has helped to ease the reassembly congestion, he explained.

Optimum tape subsystems for 360 and 370



IBM 370's

Installed or on order.

Talk with CSA, a computer leasing company prepared to show you the way to greater prime and extra savings, plus the extra advantage of investment tax credits directly or in the form of a lower rate.

For further information, please call 800-447-4871.

**Computer Systems
of America, Inc.**
A computer leasing company.
79 Milk Street Boston Mass. 02109

Send for the 12 questions you should ask of any leasing company before you lease.

Name: _____

Title: _____

Company: _____

Address: _____

City: _____

State: _____ Zip: _____

370 on order installed

Model: _____ Date: _____

Totally Compatible Flexibility

When the name Ampex is on a tape subsystem, you know you'll get Ampex reliability plus optimum performance and flexibility. The Ampex TM-34/TC-38 is typical. It is totally compatible with IBM 360 and 370 systems, with the TC-38 replacing 2803 and 3803 controllers, and the TM-34 replacing 3420, 2420 and 2401 tape drives.

The TC-38 Controller

Superior error-correction capability to significantly reduce re-runs. Compatibility with future changes in IBM OS through controller microprogram updating without hardware changes. Random-access semiconductor read/write memory provides microprogram storage and extensive diagnostic facilities. The tape drive automatically loads microprogram into memory. Many more sophisticated details that result in optimum performance.

The TM-34 Tape Drive

All the advantages of IBM 3420 drives, including speeds to 100 ips, radial interface, automatic threading with or without reel-around cartridges, and single cartridge drive for greater reliability. Modular design for easier faster maintenance. In brief, the ultimate in tape drives for 360 and 370 computers.

What else could Ampex add to this complete tape subsystem? That the TM-34/TC-38 costs less to acquire and to operate than IBM subsystems? It certainly does!

Call your Ampex computer specialist for details about tape subsystems, disk drives and core memories.

AMPEX

AMPEX COMPUTER PRODUCTS DIVISION
1500 West Jefferson Boulevard
Marina del Rey, CA 90231 (213) 821-8555

Canadian Cities Study

Computer Can Protect Privacy More Than Jeopardize It

By Edward J. Bride

OF THE CW STAFF

ANAHEIM — Computers, properly used, provide a better way to protect privacy than to jeopardize it, Prof. John M. Carroll of the University of Western Ontario concluded from a Canadian study of institutions keeping data banks.

"I don't link computers with the invasion of privacy at all," he told on FJCC evening session on security. Carroll said that complaints on the accuracy or accessibility of personal data were not affected by the fact that some files were maintained on computers.

In fact, in the process of computerizing files, many serious errors were discovered in the manual version, he noted. The study was conducted last year under the authorization of the Canadian Department of Justice and Communications.

Engaging in the Canadian study, the U.S. National Academy of Sciences (Westin) report and the Canadian task force all came up with similar results: "Most people don't give a damn" about the possibility of privacy invasion, Carroll stated.

The FJCC session last week was attended by about 250 people, but by the end of 2 1/2 hours fewer than 50 were left. Attendees suggested the session failed to give answers to the security problem, but session chairman Rein Turn noted that answers were not promised in advance publicly.

Committees Failed

The three study commissions failed, however, by not investigating secret files of the Canadian government.

While some of the results of that study have a sameness, there are other facts that are not so well known and that are of great concern to Carroll, he indicated.

Most large companies exchange data with their U.S. counterparts (where such counterparts exist), and one-fourth of the Canadian firms will have files and DP operations actually located in the U.S. within the foreseeable future.

The reason for this is that there is a "surplus of DP capacity" in the U.S., and Canadians will probably take advantage of this. "Cybernetic imperialism, you might call it," he said, stressing that the predicted combination



CW Photo by Edward J. Bride

of efforts presents a "serious future problem."

Since computer capability tends to be utilized, he continued, the growth in data banks will be one of depth, rather than breadth. This presents still another problem to the protection of privacy, since more can be ascertained about individuals, rather than gathering a little data on many people, he noted.

Computer manufacturers should pay at-

tention to the need for a secure operating system, safe from tampering and from unauthorized access, consultant Stanley Rothman told the session.

Rothman said there are indications that users will bind together on a Federal Government level, and write procurement specifications that dictate the security of computer systems.

Rothman also said that in every case of states exchanging data files on individuals, uniform state laws should govern these exchanges. Uniformity will be difficult to achieve, he noted, but it is necessary if data is to be exchanged between states.

Chairman Turn, speaking on the security problem, said only that the selection and implementation of appropriate safeguards are "difficult and poorly understood processes."

As a beginning, Turn suggested users must appraise the value of their data to their own company or agency, and then try to discern how much the data might be worth to an intruder. After assessing the cost of protection, users would then

be able to have a starting point to achieve security.

Turn, a data security specialist with the Rand Corp., said that criminals have been able to access and remove files from both manual and computerized systems.

Such unauthorized access could take place in business, too, and "what is needed is data security engineering" to prevent these problems, Turn said.

In general, government is willing to spend large amounts of money on physical security; business can use the same data as proprietary data, but "personal data is subjective" and difficult to evaluate.

The circumstances of the individual and the possible market for data all make it difficult to put a value on data, he continued. In addition, it is difficult to measure a system's susceptibility to subversion by people, rather than by technology.

Few questions were posed to the panel regarding ethics, politics or the technical ability to protect privacy through a bank of data, although the chairman and the panel were familiar with the many studies undertaken in the past year on this issue.

Full System Depends on Good Balance

By Marvin Smalleheier

CW Correspondent

ANAHEIM — The key to creating a full computer system for manufacturing is setting up good balances, Richard Lilly told an all-day FJCC seminar on DP in manufacturing.

Lilly, president of Manufacturing Management Sciences Inc., Burlington, Mass., said that many companies fail because they are not full systems.

A major sin producing the imbalance is lack of effective documentation.

There must be sufficient information at all levels from the floor person to management and it must be enough for upper management to establish inventory policies and examine alternatives.

Two additional areas must have sufficient documentation to understand the principles and theories involved. Operating personnel must be able to understand reports, exceptions and actions on a day-to-day basis.

Lack of continuing management con-

trols, Lilly said, prevents management from establishing effective management systems, a cause for one of the main reasons for failure of an inventory system.

The inventory management system control record, Lilly said, is the most vital management report in the system because at the end of the day the inventory manager can quickly determine what is in stock, conditions or out-of-balance conditions.

Another fatal sin, he said, is the inability to trace updated transactions.

"A major complaint of inventory control personnel is that once a transaction updates an item's status, either the time required to effect the transaction is prohibitive or the transaction disappears completely," Lilly noted.

"Thus, when the inventory record and physical counts are not identical and there is no audit trail information to show the reason, the system's credibility decreases at each occurrence until at some point the user simply bypasses the system

by setting up his own manual system. In control of the system must be given the authority to trace at least 30 days of transactions through inquiry. In other words, an audit trail of all processed transactions must be chained to each transaction," he said.

Regarding the inability to trace rejected transactions, Lilly said, the problem results because there is no positive control of transactions once they have been rejected.

"Any rejection should at least suggest a correction, yet no formal procedure for error correction exists. There must be some positive proof that the correction has been made."

Lilly also cited lack of adjustment date filters and ignoring the presence of human error.

"One of the main benefits to be gained by computerization of inventory," he said, "is the measurement of the error in the forecast and its use in establishing safety stock to meet a required level of customer service."

"Most often overlooked, however, is the fact that a number of items do not have a demand which is predictable, due to its lumpy character."

"The user must decide whether he can justify carrying a higher level of inventory to accommodate the high demand (peak) that occurs infrequently."

'Getting Most out of Nuts and Bolts'

Special to Computerworld

ANAHEIM — Manufacturing firms which want to use the computer to its best advantage should treat it as a low value item like a nut or a bolt.

Oliver Wight, a consultant, also told an FJCC seminar: "You need it (the computer) to put your product together, but the more standard it is the better you are."

"People make the system work," the system doesn't do anything. It just generates information," Wight told an audience of about 200 persons at the Disneyland Hotel.

"The computer is a way to enhance people so they can do a better job," he said, but cautioned against making the computer system too automatic, the people working with it will have control over the system.

"The worst recommendation for a system generally is that it works in another division," Wight said, and he commented that such a system is hardly ever transferable unless the people using it are also transferred.

Manufacturing with the aid of computers, Wight stressed, is an elusive area "but a very, very big payoff area."

Wight said, however, there is "nothing profound" to making computer systems work in manufacturing and detailed what he called "secrets" of making them work.

The first, he said, is recognizing the

difference between a formal system and an informal system.

"The limitations of the annual system used in manufacturing plants has made it impossible for a formal system to work," Wight added, and attributed the failure of many computer systems to the inability of programmers to recognize what was the informal system and what was the formal system.

"Priority planning is the guts of production control and you have to control capacities and priorities," he indicated.

Material Requirements Planning, he said, is necessary for production control of any system, but dependent on materials and labor. He also said that both involvement and education are necessary for inventory and production control.

"Involvement means accepting the responsibility for the success of the system. You have to educate the user right from the beginning, not after the system is designed."

Wight also warned against frivolous sophistication.

"People on the floor abhor sophistication. The simpler your system, the better. Sophistication doesn't work today. Today we are having an orgy of sophistication and nothing kills a system faster," he

said.

Give the people control over the computer, he said. "Don't let the computer run the people."

MRP a Boon to Inventory Control

Special to Computerworld

ANAHEIM — Material Requirements Planning (MRP) as an inventory and production control tool for manufacturers using computers came under close scrutiny by one FJCC seminar.

Robert Galante, vice-president, Manufacturing Management Sciences Inc., Burlington, Mass., explained how to set up an MRP program and master schedule and told his audience at the Disneyland Hotel to be realistic about what such a system can perform.

"The system is not set up effectively, the informal system that existed before will come back."

He warned the user against trying to put more into the system than he wants it to put out.

To combat resistance to an MRP system, he said, it is necessary to go directly to the general manager. And he added the system must be built as a bridge between manufacturing and sales.

Once the system is under control, he said, the result is that there are not as many fires "with everybody fighting everything and anything because they never know what will come up."

The system, he said, is a boon for requirement planning. Galante said, is really the long-term solution because it allows the user to change all items when any one item is in a plan changes. "It is current all the time."

He suggested that frequent or even daily replanning could be feasible, depending on the company and its products.

The trouble with statistically tested parachutes should be obvious.

We think the same thing holds true when it comes to computer tape.

We make Epoch 4. And we've just never been able to bring ourselves to test it statistically.

A lot of manufacturers don't feel that way. Maybe it's because they're not willing to admit that every now and then a speck of something just might get through the clean room and onto your tape.

And there's always the possibility that a coating hole might get through.

That's why every reel of Epoch 4 is 100% certified.

And that's one of many reasons why Epoch 4 is the finest tape buy on the market today.

Mistakes happen.

The difference is, Graham Magnetics doesn't sell them.



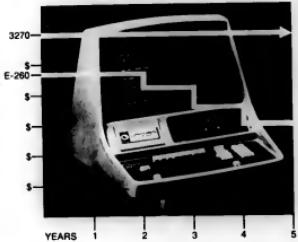
 **GRAHAM**
MAGNETICS

GRAHAM, TEXAS 76046



CN panaroma by V. J. Farmer and H. Fling

If you rent terminals on a monthly basis you're losing money. There is an alternative.



Your terminal applications and systems have a useful life measured in years rather than months. So why rent terminals on a costly, month-to-month basis?

Courier's new extended lease plan can save you from 15 to 30% of the 3270 rental. Plus guaranteed renewal prices with even greater savings in years 3, 4, 5, etc.

There's no discount of Courier quality features. Such as insert/delete. Protected format mode. Fully-buffered terminals. Full-function keyboard. Remote or Local. Or dial-up. Choice of 480, 960, or 1920 screen sizes. Fastest response time. And Courier Executerm terminals are plug compatible with 2260 and 2265. No costly software changes.

It's a matter of good business sense. You save money, and you know what your costs are going to be in the years ahead.

And isn't it nice to know you have a choice.

Los Angeles (310) 841-4465, San Francisco (415) 848-8460, Dallas (214) 651-8558, Kansas City (816) 234-4420, Milwaukee (414) 784-5107, Pittsburgh (412) 237-1111, Atlanta (404) 951-1111, Boston (617) 736-4555, Chicago (312) 442-6318, Philadelphia (215) 574-4655, New York (212) 736-4555, Boston (617) 736-0220, Houston (713) 228-5561, Phoenix (602) 258-2771, Denver (303) 389-6990, Cincinnati (513) 459-1588, Minneapolis (612) 839-4999.

Consider the alternative:



Courier
terminal systems, Inc.

A SUBSIDIARY OF BOOTH COMPUTER CORPORATION

2202 E. University Drive, Phoenix, Arizona 85034

Most Users Happy With FJCC Format

(Continued from Page 1)

The reaction covered the extremes. For example, the six sessions that effectively constituted a "mini conference" on network management and design had received an enthusiastic reception from attendees. In fact, so many wanted to attend these meetings that standing room only was the watchword as the sessions spilled over into the hallway.

Session attendees commented on exploring one idea in depth, such as the measurement session and most seemed to welcome the idea.

"We're just getting into this area," one said, "and in a day and a half I can get all the basic information I need for future planning. It's a great idea."

There was some criticism, however, of the more technical sessions, with several users and industry people indicating that some of the topics were too specialized to be of much interest to anyone except the small circle of other experts in the field.

"I come here for an education," one source said, "but most of these technical meetings I have been to have been so technical and detailed, I didn't really understand them. It seems to be one small group of technical experts talking to each other in many cases," he added. Exhibitors generally liked the show, and many said they had more time to sing their praises days are here again.

While the upturn in attendance and in attendees' attitudes on buying was seen as a positive sign, Afips was even more optimistic about next year's National Computer Conference and Exhibition. Of the projected 30,000-50,000 attendees that would attend that conference, the first of the annual meetings.

The move to Anaheim, from what was becoming a traditional FJCC site in Las Vegas, was done to bring the conferences closer to users and to computer designers, Afips said.

The exhibits, though, closed at 6 P.M., leaving little time for some users to view what was heralded in Afips publicity as the latest in computer products.

Exhibitors and some attendees felt "the people they really wanted to see" would be able to get off time during the day. The exhibitors were also concerned about the ability to staff their booths during evening hours, Afips noted.

Still, planning for the new national conferences will be on a three-year cycle, going from the East to the Midwest and then West Coast, Afips related. Thus, New York will be followed by Chicago for the 1974 show.

A site for 1975 apparently not been chosen, but Afips said that Anaheim remains a good candidate for future conferences because of its location in the heart of the West Coast computer industry.



FJCC Panorama of the Exhibit Floor



Puppets marched to the recorded sales pitch of Ampex cooking Chef P. Ripherals and "Sylvia," cooking up a mixed system.



Sometimes the plotters gave the pinups too much of the wrong thing.



General Automation raffled off this new Subaru automobile to demonstrate its SPC-16 min's prowess at checking auto-electrical systems.

A Look at the Last FJCC



One writing table is as good as another.



Keep smiling
Photos by V.J. Farmer



Kodak presented its KOM Microfilmers.



ACM's booth was to the point.



Three days later . . .



Vortexx sent its audio-response system from outer space.



Rixon/Sangamo uses card tricks to gather a crowd.

Use of Measurement Tools 'Responsibility of Management'

By Don Lewitt
Of the CW Staff

ANAHEIM — The use of any techniques to measure or improve the reliability of software is important, but how a technique may be, it won't do any good if management doesn't know how it should be used and doesn't require its careful implementation, Commander Grace Hopper told the FJCC session on Measurement of Computer System Performance.

Even the increasingly popular concept of developing proofs of correctness of programs is no assurance that the software is completely good, she said, noting such proofs generally confirm only that good input produces good results, not proofs that explicitly reflect what the programs being analyzed trap all invalid input data, and that is a major omission, she said.

Robert Gordon, a DP consultant, was critical of the performance measurement of a different kind. He said the DP consultant had to put "first things first" and define where it is going, "so that we'll know when we've gotten there."

Specifically, he challenged several of the authors who had preceded him on the panel to provide a detailed definition of

what they meant by "reliability" of a software product. Is this simply a measure of the program working correctly for a given period of time? Or can a program, operating correctly, be considered reliable? Or is it possible to have a program, which contains unexecutable code, also be considered reliable, even though the unused code has never been tested?

Commander Hopper noted that there had been absolutely no reference in the preceding discussion about the need for standards so that software, like many

Measurement: Hardware or Software?

other American products, could reasonably be built from interchangeable parts. Without such standards, every piece of software has to be hand crafted and, in effect, re-invented to know what it has to do said.

Gordon also raised questions about non-programming systems that were intended to improve communication between the user, the analyst and the programmer. In particular he asked Alan Merten of the University of Michigan to explain how a

Panelists Robert Gordon and Cmdr. Grace Hopper lead session on Software Performance.

user who had no knowledge of the capabilities of a computer or its peripherals could be expected to use Problem Statement Language (PSL) effectively.

PSL, Merten had said earlier, is a free form language which allows the user-processor to describe what data is available and basically what he wants to do with it. It is intended to support the validity of the request, the correctness of the programmed solution and the effectiveness of the solution as it is performed.

By design it is data-oriented, he noted, and is not concerned with what device the program is to be run on. He cited a model, for example. This was specifically the problem Gordon was concerned about: with PSL, the ultimate user might not even be aware of the possibility of graphic display which might be far more effective than the tabular printout the programmer chose.

Currently PSL has an analyzer which reviews the completeness and consistency of data being proposed for a programming project, but it does not review any logic plans. It could conceivably be used to generate code but this would probably be limited to the Data Division of a Cobol program, Merten said.

Prof. Norman Schneiderwind of the Naval Postgraduate School was under heavy fire during much of the session for attacking the concept of the reliability of a software program. In his view this could legitimately be a mathematical expression of the probability of occurrence of a given type of error in a given amount of time.

This type of reliability could be estimated by the program developer based on experience with the software prior to its general release. Schneiderwind said to define the reliability of a given program, the developer could get a better control over test costs, and a better understanding of the characteristics of a program that affect reliability, Schneiderwind said.

Reliability in Gordon's view was more closely related to assurance of continuous correct functioning of a system, somewhat akin to what others have called certification. The concept that a program is 95% sure of running correctly for six months, or a year, left others in addition to Gordon unsatisfied. One user noted that concept is like weather reports that predict 95% chance of good weather. It's great unless you get caught out in the 5% rain. Then you're soaked, he said.



NATIONAL MARKETING EXPANSION

The world's largest producer of Intelligent Computer Terminals is planning a major expansion in January of 1973.

The tremendous acceptance that the Model 340 is receiving plus a broadening of the Sycon product line have created a number of excellent professional openings across the United States:

CHICAGO

ST. LOUIS
INDIANAPOLIS
MINNEAPOLIS
CINCINNATI
ATLANTA
WASHINGTON, D.C.
SAN FRANCISCO
NEW YORK CITY
ANN ARBOR (HEADQUARTERS)

Midwest Regional Manager
Systems Engineer
Sales Representative
Sales Representative
Sales Representative
Sales Representative
Sales Representative
Sales Representative
Systems Engineer
Sales Representative
Systems Engineer
Product Manager
Product Specialist
Systems Engineer
Manager, Training & Documentation

(With the exception of the headquarters position, we prefer to appoint current residents of the cities.)

Midwest Regional Manager

Requires a record of personal sales success in EDP hardware and the demonstrated ability to recruit, train and motivate professional salesmen. Will be responsible for Chicago, Minneapolis, St. Louis, Cleveland, Columbus, Indianapolis, Dallas and Houston.

Sales Representative

Requires minimum of 3 years experience in selling EDP hardware and a record of quota achievement.

Systems Engineer

Will provide technical support to the sales RXForce. Should have strong background in programming/systems analysis. Hardware experience in communications equipment would be desirable.

Product Marketing Manager

Will work with product specialists and customers in development of applications. Will be responsible for Model 340 product support and future enhancements. Will participate in product planning and will be responsible for competitive analysis. Related experience with manufacturer of DP hardware is required.

Product Specialist

Graduate engineer desirable but not mandatory. Should have had considerable exposure to electronic hardware design and development. Should have familiarity with electronic component manufacturing. Will be responsible for technical support of products sold to OEM customers.

Manager - Training & Documentation

Minimum of 3 years experience in EDP related RXForce training and documentation with a background in programming. Will organize and supervise customer training programs. Will write, edit and supervise production of operators, programmers, and reference manuals for Model 340 and future products.

Please Submit Resume and Salary History To:
Mr. C. J. Gossman, Dir. of Relations

SYCOR INC.

100 Phoenix Circle
Ann Arbor, Michigan 48104

An Equal Opportunity Employer



CH Photo by Edward J. Burke

Panelists Robert Gordon and Cmdr. Grace Hopper lead session on Software Performance.

user who had no knowledge of the capabilities of a computer or its peripherals could be expected to use Problem Statement Language (PSL) effectively.

PSL, Merten had said earlier, is a free form language which allows the user-processor to describe what data is available and basically what he wants to do with it. It is intended to support the validity of the request, the correctness of the programmed solution and the effectiveness of the solution as it is performed.

By design it is data-oriented, he noted, and is not concerned with what device the program is to be run on. He cited a model, for example. This was specifically the problem Gordon was concerned about: with PSL, the ultimate user might not even be aware of the possibility of graphic display which might be far more effective than the tabular printout the programmer chose.

Currently PSL has an analyzer which reviews the completeness and consistency of data being proposed for a programming project, but it does not review any logic plans. It could conceivably be used to generate code but this would probably be limited to the Data Division of a Cobol program, Merten said.

Prof. Norman Schneiderwind of the Naval Postgraduate School was under heavy fire during much of the session for attacking the concept of the reliability of a software program. In his view this could legitimately be a mathematical expression of the probability of occurrence of a given type of error in a given amount of time.

This type of reliability could be estimated by the program developer based on experience with the software prior to its general release. Schneiderwind said to define the reliability of a given program, the developer could get a better control over test costs, and a better understanding of the characteristics of a program that affect reliability, Schneiderwind said.

Reliability in Gordon's view was more closely related to assurance of continuous correct functioning of a system, somewhat akin to what others have called certification. The concept that a program is 95% sure of running correctly for six months, or a year, left others in addition to Gordon unsatisfied. One user noted that concept is like weather reports that predict 95% chance of good weather. It's great unless you get caught out in the 5% rain. Then you're soaked, he said.

To make sure you're paying as little as possible for tape, disc or core storage, make a collect call to Jack Flynn at (617) 266-4950.

I'll get you the lowest rental charge in the business.

As low as one-third of what you're paying IBM for a 2311, 2841, or 2401, Models 2 and 3, Models 40 and 50 Core Storage.

And Jack'll get it all for you from one source.

From us.

Bankers Leasing Corporation, as the marketing and administrative representative for Diebold Computer Leasing Inc.

The people who can lease you the tape, disc or core storage you need for less.

Or lease you an IBM 360, Model 30, 40, 50 or 65 in any configuration you need.

Wherever you need it.

With IBM continuing to maintain it after it's installed.

One collect call to our Jack Flynn will tell you exactly what we can save you on exactly what you need.

Bankers Leasing Corporation

1255 Boylston Street, Boston, Mass. 02215

The Question Is:

What System Parameters Should Be Measured?

By E. Drake Lundell Jr.
Of the CW Staff

ANAHEIM — The largest problem facing developers of measurement systems to analyze system performance is that no one knows exactly what to measure, attendees at a session on "Measurement of Computer Systems - System Performance" agreed.

Everyone has his own ideas of exactly what should be measured to gain a handle on the effectiveness of a complete computer system, said a software engineering consultant, indicated.

And until the practitioners in the field can agree on the parameters that are necessary for effective measurement, the field will be held up, he said.

Today the use of computer performance analysis ranges from feasibility studies through post-implementation hardware augmentation, according to Seymour Jeffrey, Chief of the Systems Development Division at the Institute for Computer Sciences and Technology of the National Bureau of Standards.

Presently the techniques are used basi-

cally, he said, to maximize throughput, decrease turnaround time, identify levels of utilization, modify device allocation and determine modification requirements.

The presently available tools to perform these functions include hardware monitors, software monitors, simulation (discrete event and simulator packages) accounting systems and benchmarks, he noted.

Of these, he indicated, hardware monitors have either no, or just a slight, degradation effect on the system being tested, while software monitors have a good to excellent effect.

The level of detail produced by the software monitors, he said, is generally in the medium range, while with hardware devices the level is dependent on the device and covers the entire range from low to high detail in the analysis.

He said that for mainframe systems, the number of devices is essentially zero, with only extraction software required.

Software monitors, however, usually require 5K to 10K of core space and 3%

to 10% of the CPU cycle times, he said.

There are no detailed studies of how users are presently using measurement techniques, he said, and a recent survey of government computer users with measurement systems indicated software monitors were used in around 23% of the installations, simulation in around 18% and hardware monitors in about 19%

order to perform measurement studies are increasing in sophistication, he said, "unfortunately the user has not always been able to use the sophistication of the tools."

He noted development is underway with hybrid hardware software monitors combined with accounting systems to "provide complete data for performance analysis."

Conversational monitors for real time information based on a user's questions about system performance will also be available, with these other system problems to be solved in the computer.

He also noted one of the problems with hardware monitoring is the difficulty of identifying probe points and making physical connections, but said that a central probe point on mainframes could eliminate this problem.

Another thing that would help users perform analysis work would be the development of CRT displays that allow the analyst to easily visualize the performance measurements and their graphical representation of measurement data.

One of the most significant developments in the future, he indicated however, would be development of hardware monitors built into the mainframe by the hardware manufacturers, but some in the past have wondered if the hardware manufacturers really want users to be able to quickly identify the performance of their systems.

But even with all of these tools, Jeffrey said "the EDP manager should be aware that the tools and techniques themselves do not offer the answer to performance improvement."

"It takes a trained expert in the use of these tools and in the hardware and software that the tools measure to perform the required analysis. The tools serve as an aid to understanding, but it's man's ability to properly interpret the measurements taken by the tools which makes for successful performance analysis," Jeffrey concluded.

Users Best Catalyst for New Tools

ANAHEIM — It is surprising that hardware monitoring tools are not more widely used, because a small investment can produce tremendous savings, according to panelists at a session on "Measurement of Computer Systems - Hardware Monitors and Their Applications."

The panelists indicated users must become more active in the design phase for these devices in order to press the manufacturers to supply tools that are more effective and that the user needs more efficiently than at the present.

Richard Rued of Applied Computer Technology said the current tools available to the user are "abysmal," but noted manufacturers are making a good start in getting capital from investment sources to develop such systems because of the impression that users are not interested in monitoring.

User Ultimate Loser

The user is the ultimate loser, he said, when money is not available for development efforts in this area, because there will not be as many tools available in the future as firms drop out of the market.

Tom Grunberg, manager of systems for systems that take advantage of the capabilities of minicomputers under the heart of the monitoring system.

Both hardware and software are "absolutely essential" for the development of effective monitoring tools, he said, and efforts are being made in this area. Because of this, he said, the artificial barriers should be dropped and the two should be joined in future monitoring systems.

Another defect in the presently available systems, he said, is that probes and connectors are not designed for super-sophisticated computers on the market. The technology is presently available to develop these faster probes and counters, but no one is taking advantage of it, he indicated.

He said the user must press manufacturers for more effective measurement and he suggested combined user-manufacturer teams might be best to develop the software needed since the user often has greater software expertise than the manufacturer.

Jeffrey noted a user of the Applied Computer Technology monitor, told the group that future development efforts should be directed toward developing systems that can answer significant user questions and not just monitor the system.

But in the long run, he said, the answer to monitoring is to build them into the mainframe, noting that "if a monitor and

probes can be built into a Volkswagen, they certainly should be built into a computer."

Noe warned other potential monitor users that they should not get started monitoring their systems until they have a well developed plan of where they want to go and what they expect from the effort.

He also backed the contention that the user should be hardware and software monitoring systems to be effective.

He also stated a user has to constantly make sure he is getting the measurements he needs and noted it is sometimes hard to tell if he is measuring the right thing and that the measurements are correct.

There is an important consideration, Curton said, since the best tool available is meaningless without proper maintenance. Another factor to be considered is the expandability of the system, he said, and users should make sure their monitors can meet their future requirements as well as their present needs.

The user should also press for good useable documentation and training and should make sure that the system is compatible with other measurement tools available.

Measurement: Art or Science?

ANAHEIM — Measurement and performance evaluation of computer systems is "an art trying hard to become a science," action chairman Dr. Arnold F. Goodman of McDonnell-Douglas told a session on "Measurement of Computer Systems - Art or Science?"

At the same time, Goodman indicated that most of the efforts in this area at present involve measurement and performance evaluation after the fact — after a system has been designed and built.

Monitoring tools needed to predict how a system would perform before it was built and placed on the market so that inefficiencies could be caught early enough to be designed out before the system is installed.

Two Different Approaches

Presently, he said, there are two different approaches to the development of measurement systems: a theoretical approach and one based strictly on quantification of collected performance data.

In the theoretical approach, there will be a need for a combination of the two in order to develop effective measurement systems that cannot only measure after the fact events, but that will also have predictive ability.

Robert Johnson of the Burroughs Corp. indicated in the design process, "measurement often comes last and is frequently forgotten" by computer designers, at least forgotten until it is too late.

He said it is amazing that at present "we have a \$10 billion industry and still no one can tell us exactly what our product does."

He said there is a need to come up with

a simple measure to describe various systems performance factors in order to simplify the user's decision process when purchasing new systems or adding to present ones.

In many cases it is hard to adequately describe system performance, he said, because "one of the things that make systems easy to use, do not benchmark well and add to the cost."

"A total and ultimate evaluation of any product is not and cannot be an absolute science," according to Louis Robinson of IBM.

This is because many of the attributes of computer systems are not quantifiable and reducible to set or exact figures, he said.

Many people look at the same product in different ways, he continued, so what is a plus to one user might be a negative feature to another.

A recent study by the General Accounting Office indicated that a true measure of system quality "should take into account both efficiency and effectiveness, with efficiency relating to the cost of producing the output," according to Edward J. Mahoney, director of financial and general management studies for the government agency.

In order to help perform studies of effective systems, Mahoney called on all computer users to contact the General Accounting Office with outstanding expectations of right-producing DP operations and why they are producing, and promised that the government would share information it develops in this area with users.



What Are Options?

Optimizing OS? Evaluate First.

By Don Leavitt
Of the CW Staff

ANAHIME — The functioning of a given operating system often can be optimized by knowledgeable users, but the resulting performance would take depends on the individual innovator's evaluation of the options open to him. The trade-offs have to be considered, according to T.J. Teorey of the University of Wisconsin.

Speaking to the FJCC technical session on operating systems, Teorey outlined, as an example, or possible trade-offs, what users should consider before implementing a disk-scheduling system.

His think-about-it-first approach was echoed by James C. Brown of the University of Texas who described the possible interactions of multiprogramming, job scheduling and CPU scheduling.

Later in the same session, Daniel L. Murphy of Digital Equipment Corp. described the philosophy of the Tenex virtual memory system. For the Decsystem-10 and Karl N. Levitt spelled out some of the work being done in proving at the Stanford Research Institute.

Teorey noted some users contend there is only one disk scheduling policy, while others see the possibility of selecting the most appropriate from the several scheduling schemes available.

On the other hand, he suggested, it is entirely possible that factors having nothing to do with the disk itself may make it completely useless to install a new scheduler to optimize the disk.

Users must consider the effect of scheduling in terms of the performance of the single disk device, the disk subsystems, when there are two (one disk) and the total multiprogramming system. To understand the trade-offs, Teorey's group de-

veloped a set of meaningful models of possible disk schedulers.

'First Come . . .'

These models allowed him to study the throughput, mean response time and variance in mean response time made possible with the different possible scheduling schemes. One model adopted a first-come/first-served approach, one in which the shortest seek time was handled first, and three variations of scanning for seek.

The effectiveness of the schedulers was measured by the pattern of the load imposed on the channels and controller as well as the disk itself, and by the presence or absence of rotational latency.

There are several conditions in which seek time is not, and cannot be the dominant consideration, he added, citing multiple track records, sequential processing and write-back write-interleaving. In these cases, seek time optimization is a worthless goal and might just as well be forgotten.

The choice of job scheduler and CPU scheduler must also depend on the desired goal of

the system, Brown told the overflow audience at the morning session. There are four separate approaches to both scheduling and scheduling and the combination used can have an imprecise effect on the system.

Working on a CDC 6600, he built models of the possible schedulers, including for the two jobs — the CPU utilization — the "non-scheduling" first-come-first-served approach.

Other techniques included "shortest time to run first," "smallest cost first," and "smallest burst time first." In scheduling, a round-robin, smallest time remaining first, "shortest burst time next" or "longest burst time next" techniques were considered as bases for CPU scheduling, he said.

Throughput Rates

There is an enormous difference in the throughput rates produced by the different job scheduling algorithms, he said. For the two methods, the shortest time first and smallest cost first, give "strikingly better performance" than the other approaches, said. Throughput is more sensitive to the differences in scheduling than in CPU utilization, he added.

In building the Tenex system



By Photo by V.J. Farmer

Daniel L. Murphy



T.J. Teorey

for the Decsystem-10, Bolt, Beranek and Newman Inc. had three goals, DEC's Murphy told the session. The system was intended to simultaneously support (1) on-line editor, (2) the compilation and execution of the resulting object code; (3) very large jobs that wouldn't fit in available real core; and (3) very small highly interactive jobs.

To do this, Tenex built a paging hardware management system on top of the DEC mainframe. As a result, the system now provides a 256Kb virtual memory for each process, and backing for a multiprocess job structure with software. The powerful file system is provided along with what Murphy called a "human-engineered" command language.

Programs, pages, under Tenex, are 512 words long, he added. They noted this page size was used just because "it didn't seem too big, and it didn't seem too

small." The system allows the use of non-contiguous slots in real core and supports the use of data and programs from various sources.

Described as "not quite as powerful as Multics," Tenex makes good use of real core, Murphy explained, by continuing DEC's standard approach of reentrant code for the basic programs, and all the "generate" code exclusive to each user. Tenex carries the concept further, however, in supporting the use of private libraries as well, he said.

Tenex also uses a system of Job File Names, made up of a file identifier and a page number, to pinpoint the specific page each user process is accessing. This allows several processes to access the same page, and to do this simultaneously, without conflict. The techniques also enable a single user to access several pages concurrently or sequentially, he added.

Software Complexity the Limiting Factor

By Don Leavitt

Or the CW Staff

ANAHIME — Complexity of software is the "third dimension" in studying system design, according to Dr. T. J. Teorey, first two dimensions — storage control and throughput — complexity is the limiting factor. "It has reached the point where users find it easier to understand how an operating system works," Dr. Harlen Mills of IBM's Federal Systems Division reminded one of the FJCC sessions on software

engineering.

Earlier, Clark Weissman of System Development Corp. told another session that as software grows, software costs were not more acceptable, particularly in the light of cost/performance reductions in hardware. But, he added, several users have been developing tools and techniques, and neither the cost nor the time to maintain them to attack the problem.

Part of the problem according to Dr. Fred Haney of Xerox is that even if modular programs, memory techniques, and software reuse are used, a change in one module can be expected to trigger a chain reaction in other modules throughout the program or system.

The reaction may carry across modules on several levels of relationships, he noted, so even strong efforts to isolate modules from one another in that way may not suffice.

Nonetheless, the modular connection analysis (MCA) approach can be used to estimate the cross-module effect of a change, either after the need for a change is known, or before a program failure, or before a "desired" change is made to "enhance" a system.

With MCA, he said, a system is recognized as hierarchical in structure, perhaps consisting of subsystems, modules, and subroutines, with some interdependence possible between parts of the system at any level.

Relatively simple metrics can identify the number of possible impacts of a change on parts of the system, including perhaps ricochet effects on the module which started when it was first changed.

MCA differs from earlier techniques with similar goals in that

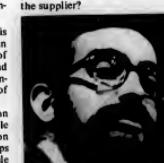
it considers just the internal system structure and its environment, it is a simple, simple format and can be applied regardless of the type of change being made or contemplated. In any case, he said, it has succeeded when applied to work Xerox has done to maintain its Universal Timesharing System to it is clearly better than intuition.

James Brown of TRW Systems Group attacked the problem of software development from a different angle, describing how his company developed an automated testing technique. It seems to go a good bit of the way toward solving the usual problems:

- How much testing is enough?
- What can be done about the high cost of testing?
- How can the results be made more visible?

How Systems Work

- What can be done to improve the confidence in the final product, for both the user and the supplier?



James Brown

The Product Assurance Configuration Evaluation (PACE) program imposes a management control and level of objectivity on the testing process that TRW just didn't have before, Brown said.

The technique makes the user approach his problem and solve it, and it is a good way to not go to a new step until he has solved the previous one. In effect, it directs the programmer toward "top down" or structured programming.

One of the elements of the Pace system, Brown said, is a Fortran source code checklist system called Flow. Even without executing the target program, Flow can report many things about how the user would proceed. Flow's ability to identify those parts of the target program that would never have been accessed or executed is perhaps its greatest advantage, he said.

Optimized output from Flow includes timing studies to support code optimization efforts, and several trace routines. One trace display aids debugging, while another option identifies where there is a problem logic.

By printing test results, Flow quantifies test efficiencies, and cuts long-range test costs. It also provides a record of both what happened in the test and ultimately increases the confidence of both the user in the reliability of the software when it is delivered.

Although Flow or the other elements of the Pace system don't directly determine how much testing is enough, they do provide a teaching function (as a byproduct) so users can realize when further effort is justifiable and when it is not worthwhile in terms of improvement that can be expected.

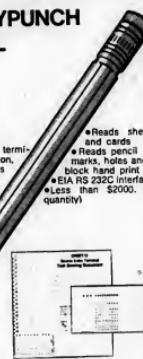
Replace Your KEYPUNCH with a 5¢ PENCIL



New low cost source data entry terminal, ORBIT/2, eliminates transcription, keypunching and costly delays. Lets you enter original data directly at the source from the original source document.

ORBIT/2, selling in quantity for less than \$2000, is a hand-held data entry terminal. It is designed for economical capture of marked sheets or cards at remote locations.

Make your mark.
Solve your
data entry
problems...
order your
ORBIT/2
now!



ORBIT SYSTEMS, INC.

Church & Fellowship Rds., Moorestown, N.J. 08057

(609) 234-1700 Telex: 63-1429



For the Inexperienced User

Debugging Tools, 'Natural' Input Ease Programming

By Don Leavitt
Of the CW Staff

ANAHEIM — Much work has been done to make the power of the computer accessible to the inexperienced programmer and to the non-DOS professional, and efforts in this direction are continuing at an increasing rate, according to Prof. Howard Morgan of the University of Pennsylvania.

Chairing an IFCC session on Human Engineering of Programming Systems, Morgan noted that some of these systems have been built to support the user's natural way of input; others have easier the debugging of programs written in "computer-like" programming languages.

Thomas Williams of System Development Corp. described an experimental, interactive graphics system called the Transcendent Mathematician (TAM). The TAM user works on a data tablet as an I/O device, entering data and operations to be performed using handwritten symbols. The system responds

through a CRT unit whose screen is rear-projected onto the data tablet, Williams said.

The system has a basic repertoire of 120 symbols, but each user defines the way in which he wants to use them so there are virtually no restraints in the input form, as long as the particular user is known to the system. TAM is able to perform most mathematical operations working from the same notation the user would expect if he were solving the problem with paper and pencil.

Developed jointly by the National Aeronautics and Space Administration (Nasa), Advanced Research Projects Agency and SDC, TAM effectively makes mathematical programming in the usual sense.

Even common mathematical constants such as Pi are built-in, Williams noted.

The system includes editing capability and prompting of the user when an unrecognized symbol is entered, but some

problems still exist, he added. Perhaps the biggest of these problems is the "normal ambiguity of mathematical notation," he said, admitting the problem of how to interpret parentheses had not yet been solved.

TAM's method of "protecting" the user from the computer language is to let the designer provide a language for PL/I that have been implemented on the MIT/Honeywell-developed Multics virtual memory time-sharing system. These allow the user to work directly with the language itself to develop his program.

Multics is written in PL/I, Barry Wolman of Honeywell Information Systems told the session. This means the debugging tools for user-level PL/I programs are available to the designer. Some of the language features are critical to Multics. And virtual memory is directly useable by the PL/I user, since the virtual address corresponds to the PL/I pointer value, he noted.

Debugging support includes a

run-time symbol table, a map of the object program and, after execution, a profile table, showing how many times each source statement was executed.

The Multics PL/I debugging package also provides the user with control "hooks" throughout his program. These hooks can be used any way the user wishes — to set up breakpoint controls or take execution control. The user can also define of how they are to be used determined at run-time. Thus two consecutive tests could provide different debugging sup-

port, he noted.

Carole Dmytryshak, vice-president of Bankers Trust Co., described the Fortran Language Environment (FAL) which falls somewhere between Multics PL/I support and TAM in the way it isolates the user from the programming language. FAL allows the user to access procedures and subroutines by function names that are significant to the user.

Most of the users have a familiarity with Fortran, she admitted, and this makes the use of FAL easier.

NAS's Oettinger Says

Public Best Served By Intergroup Study

By CW Staff Writer

ANAHEIM — "How information technologies are best to serve all Americans is a matter of vital public concern" that should be discussed by interdisciplinary groups made up of industry figures, scientists and Anthony Oettinger, chairman of the Computer Science and Engineering Board of the National Academy of Sciences.

During the launch speaker at the Fall Joint Computer Conference, noted many of these broad issues had been handled by the board in the past, but the board was now being phased out due to a lack of funds, leaving a great deal of unfinished work.

Issues Studied

Issues that have been taken up on an interdisciplinary basis include studies of the impact of new technologies in relation to the rest of the world, the problems of interconnecting computer equipment with the communications system, and an exploration of the current and future status of information technology in library systems.

One project under study since the board was founded, Oettinger noted, involves the issue of privacy of records stored in computerized data bank systems.

Interdisciplinary Approach

The interdisciplinary approach to all problems was the key to the board's success, indicated. "Above all, we are necessary to overcome that traditional propensity of the scientific and technological community to mutter into its own beard or whisper into its patrons' ears, in favor of addressing the general public in a loud clear tone," he stated.

"Only through the closest cooperation among experts of the most varied kinds and between these experts and the ablest geniuses available in the nation

can we begin to discern the whole range of technical alternatives that deserve consideration in important national policy issues," Oettinger opined.

Funds Expired

And while admitting it was not perfect, he claimed the Computer Science and Engineering Board had the merit of being an approximation to the ideal.

However, he said, "the money has run out. On July 6, 1972, the National Academy of Sciences asked the Computer Science and Engineering Board to bring its currently committed

work to orderly completion and to enter a period of 'hibernation' pending an appraisal of its future.

"There is an obvious moral to this story. I have been drawn to this conclusion by the sense of responsibility in striving for a national perspective in meeting the need for continuing evaluation of public policy alternatives.

"However necessary, these conditions clearly are not in themselves sufficient. Something more is needed: finding this something is a responsibility we all share."

run-time symbol table, a map of the object program and, after execution, a profile table, showing how many times each source statement was executed.

The Multics PL/I debugging package also provides the user with control "hooks" throughout his program. These hooks can be used any way the user wishes — to set up breakpoint controls or take execution control. The user can also define of how they are to be used determined at run-time. Thus two consecutive tests could provide different debugging sup-

port, he noted.

Carole Dmytryshak, vice-president of Bankers Trust Co., described the Fortran Language Environment (FAL) which falls somewhere between Multics PL/I support and TAM in the way it isolates the user from the programming language. FAL allows the user to access procedures and subroutines by function names that are significant to the user.

Most of the users have a familiarity with Fortran, she admitted, and this makes the use of FAL easier.

\$5,000 Reward

... if you can buy as
smart a CRT data terminal
for less than \$11,000!



Intelligent CRT Checklist:

- microprogrammability
- editing power
- display control command
- unique text editing and page justification
- computer interfacing
- graphics for vector and curve generation
- APL terminal capability
- ultra-reliable plug-in boards
- price (SLI's start at only \$2,975)

For more information (or your reward):

SUGARMAN LABORATORIES, INC.

3 Fairchild Ct., Plainview, N.Y. 11803

THROUGHPUT

ARE YOU GETTING ALL YOU DESERVE?

THESE PRODUCTS FROM BOOTHE MANAGEMENT SYSTEMS CAN HELP YOU ANSWER THIS QUESTION

WITH A POSITIVE

"YES"

SPOLER

SPOLER provides an efficient printer output spooling routine for DOS installations. It allows the printing of output to be independent of the destination of the output. The technique employed by the software is to save the output to disk as it is being generated, then write it to the printer as the printer becomes free — performing all of its functions in a partition as small as 4K.

Immediately available for your free trial use with no obligation, of course.

BCCXREF

BCCXREF will reduce by over 50% CPU usage for the generation of the CROSS REFERENCE listing produced by COBOL. BCCXREF will significantly reduce time in the application program region, increase throughput, and allow greater system usage for other purposes.

GET ALL YOU DESERVE!

write or call

BOOTHE MANAGEMENT SYSTEMS
A DIVISION OF BOOTHE COMPUTER CORPORATION

555 California St. • San Francisco, CA 94104 • Tel. 415/988-6580

CIMS

The Computer Installation Management System (CIMS) provides a method to supply management personnel with information to utilize the data processing hardware and software objects collected by the System Management Facility (SMF). SMF formats the data in varying sequences and formats. Reports for job scheduling, utilization, programming, throughput, hardware analysis, and other areas are provided.

Accepted by Banks,
Aerospace, Oil, Universities,
Accounting, and
many other firms.

FJCC Banking Session

Electronic Transactions Will Cut Bank Paper Jams

By Michael Merritt

Special to Computerworld

ANAHEIM — Banks are more interested in doing away with checks than most people would expect, according to an FJCC panel of "Contenders in Banking and the Electronic Payments Mechanism." And some bankers are pretty interested in some non-traditional computer-aided techniques.

A major concern of banks is the overload of paperwork, according to John Reed, manager of the First National City Bank in New York. Reed sketched the size of the problem of dealing with all the paper generated in paying a year's bills and cashing a year's checks in the U.S.

There are about 66 billion transactions a year, of over \$2, Reed said. Of these, 50 billion take place outside the home — purchases at stores, money deposits at banks, and the like; of this 50

billion, about 12 billion involve checks.

Another five billion transactions take place at home or through the mails — sitting down and writing checks to a bank for instance. Five billion other transactions involve individuals and institutions — five billion payroll, social security, pension and welfare checks. And institutions — companies, banks, government — account for almost six billion transactions between them.

Bankers are attacking this morass of transactions in several ways, Reed said. Some banks have begun to offer jumbo checks — one signed check that directs the bank to pay several bills at once. Jumbo checks can cover rent, mortgage payments, bank credit card bills, telephone, water, light and other bills, all in one crumpled check.

Another technique is use of automatic crediting and debiting of checking accounts. The bank, for example, may have

an agreement with an employee to automatically deposit payroll checks. Instead of giving a worker a check, the company — or giving a payroll tape to the bank, and the bank deposits the "paycheck" without paperwork.

Individuals can also set up programs that direct banks to automatically pay certain recurring bills — rent, mortgage payments, charge accounts — with no intervention from the customer. The individual sets a maximum payment which the bank can't exceed, and forgets about writing checks for those bills. The bank, in turn, doesn't have to process those checks.

The major problem lies in the large area of outside purchases, though. Point of sale terminals, linked by communications lines to computers, and credit cards, Reed said, can deal with paper profusion in this area.

One Ohio banker described a series of

computer-aided advances. Gordon Jelliffe of the City National Bank of Columbus described the possibility of dealing with these new techniques to four advances:

- Increased computer capability, permitting maintenance of all a customer's records on a single file;
- On-line entry, for point-of-sale terminals;
- Automated banking equipment, permitting machines to take over most routine teller functions; and
- Acceptance of plastic cards — 50 million customers now have bank cards, Jelliffe said.

Automated teller equipment is making possible a new type of branch bank, he said, using drive-up machines. Only two people staff the branch, since, according to City National studies, over 60% of banking functions can be carried on by the drive-up machines — including deposits and withdrawals, and transfers between checking, savings, and credit card accounts.

Drive-up check cashing is possible because of a magnetically encoded bank card — as opposed to a credit card — Jelliffe said. The coding contains account number, route and branch number and bank number. City National, he noted, only 24% of the customers have bank credit cards, so the bank card is necessary for the automated teller equipment.

He also described an experiment conducted by his bank in a Columbus suburb. About 10,000 customers were given encoded credit cards, and a large number of stores were given point-of-sale terminals, including grocery stores, and even the cashiers at City Hall.

The nine month experiment resulted in several nice surprises:

- The technology for point-of-sale direct data entry is available now.
- Consumers and merchants will accept on-line sales — with one reservation. Customers were intolerant of waiting very long for credit authorization at the check-out counter, Jelliffe said.
- The system is most effective just on the basis of credit authorization; less than 3% of the authorizations were rejected. There are other considerations, such as inventory control, that make the system attractive, though, he said.

The bank manager also said it is necessary to have a terminal that accepts both bank cards and credit cards, and indicated his bank's use of an as-yet-unannounced terminal made by Addressograph-Multigraph seemed likely to fill the bill.

Electronic Clearinghouse

Inter-bank handling of paperless entries — automatic credits and debits for example — is a problem that appears to have been overcome in California. Russell Fenwick of the Bank of America described the recent completion of inter-bank arrangements for dealing with magnetic tape formats, authorization procedures standards, and legal problems for computerized check clearing. He said the system had just gone live, and processed its first check.

George W. Mitchell, a governor of the Federal Reserve System, suggested several reasons why progress in this sort of electronic transfer system has been so slow. People's money habits change slowly, Mitchell said, and people haven't been persuaded that paperless banking is to their advantage. He noted that "bankers aren't generally innovators," and that, since the cost of handling paper is split up between many people, no one group has a profit incentive for pushing for the elimination of paper handling.

Finally, he noted, electronic systems would eliminate "float," the quasi-money that exists between the time a check is deposited in one bank and money is taken out of the check writer's account in another.

Save money.

Spend a few bucks for the best data entry system.

Sometimes spending less ends up costing more.

Unless, of course, you're content with a key-to-disk system that handles only a few hundred records at one time. Or provides a mere handful of input record formats. Or allows no option other than at the end of a computer batch.

On the other hand, such a limited system probably does not have enough performance for your data entry requirements.

Before you buy on price alone, consider the Entrex 480.

System 480 is the most powerful key-to-disk system on the market. The most flexible. The easiest-to-learn and easiest-to-operate. What it can do? DATA/INPUT, INPUT. A 650 record processor. Up to 10,000,000 bytes of intermediate disk storage. A variety of tape drives for output. A printer. Communications capability. And the most comprehensive software in key-to-disk.



Not just data entry. Real savings.

First class is the best way to go. Please send me more information immediately on System 480, and where I can see it in action.

name _____
title _____
company _____
address _____
city _____ state _____ phone _____

ENTREX

ENTREX, INC.
168 Middlesex Turnpike
Burlington, Mass. 01803
617-273-0480

More Secure (But Vulnerable) Systems Expected Soon

By E. Drake Lundell Jr.

Or the CW Staff

NAHEIM — Today computer users don't understand what their systems do to measure the effectiveness of their security measures. But with research now underway and with combinations of external monitors

Security: What's Ahead?

and internal controls, users can look forward to "more secure" systems in two to four years, the ACM Special Interest Group on Computer Systems Installation Management was told.

"In data security we are at the stage of trying to define what we mean and finding ways of measurement," Don Parker, session chairman from Stanford Research Institute.

There are three different types of security used today, Parker indicated, including organizational security, physical security and internal computer security.

And he noted that most intercompany theft is performed by personnel with five to 10 years experience with that particular organization — the very people who would be the most likely to be most familiar with the user's operating system and security procedures.

"They also know how you are protect-

At the same time, however, he indicated the system did increase the overhead required to obtain a monitor and that users would have to make that trade-off if they decided to use such a monitor. Robert Abbott of Lawrence Livermore Laboratories stated, however, that such external devices could not really protect a system from the systems programmers, who were closely familiar with the operating system used in a computer installation.

Opportunities Exist

"While there are possibilities in such tools," he indicated, there are still many opportunities for programmers to subvert systems."

And he noted that most intercompany theft is performed by personnel with five to 10 years experience with that particular organization — the very people who would be the most likely to be most familiar with the user's operating system and security procedures.

"They also know how you are protect-



Martinelli



Abbott



Parker

“non-DPers feel secure” “opportunities to subvert” “define what we mean”

“opportunities to subvert”

“define what we mean” security arrangement. In all, Abbott indicated it would be two to four years before we can develop "more secure" systems. He indicated that the systems would be vulnerable to the really talented systems programmer in all likelihood.

ing the system, and so can figure out ways to beat your security arrangement," he stated.

External monitors will not be able to stop this kind of person, he said, even though they do have a place alongside internal security controls in an overall

External Monitor

There is also a debate over whether computer users should put their security systems within the main computer in their center or use some sort of external monitor to oversee accesses to the main system and to prevent unauthorized persons from compromising the system.

Jerry Kennedy, president of Basic Computer Arts, described one approach to the separate control, the Data Sentinel system monitor manufactured by his firm.

This system, based around a PDP-11 and DLTapes, is a stand-alone computer separate from the main computer room and attached to a 360/370 by a "tamperproof" cable.

In its present configuration it monitors all incoming requests to access data bases that a firm wishes to keep secure. It stores all user passwords in the system, and compares a user's password against a table to determine level of access.

If the user does not have a password that would allow him to access a particular data base or file, he is rejected.

The system has four basic features, he said, in that it controls authentication of the operating systems and application programs at Initial Program Load, monitors the entire system for requests for data, provides interdiction capability, and provides security audit and management with the ability to let them spot potential penetrations of the system by correlating requests for access.

The unit, he said, does not require any special programming in the host computer, and a security guard can alter the passwords used on-line, while the host computer is in operation.

Confident Users

Phil Martinelli of Crocker National Bank in San Francisco, the first user of the Data Sentinel system, indicated the use of such external monitoring systems made the non-DP people in the company feel the installation was secure.

"The auditors feel comfortable with the external monitoring system," he said, "because they feel they can keep an eye on the programmers and other DP people."

He also indicated that whoever has the responsibility for overseeing the operation of such an external monitoring system should be outside the DP department.

Comstoc papers and films.

No hop, no skip, no jump.



When you're doing construction plotting, a skipping pen is the last thing you want.

Or lines that blot. Or dumbell. Or ink that dries improperly. Or plotting that reproduces poorly. K&E can do all that. Developed Comstoc papers and films. With specially engineered surfaces, precision alignment, and precisioninking.

End of trouble. But that's not all. We created all kinds of grid options—not just standard grids, but special grids, reverse side printing, matching colors, etc.

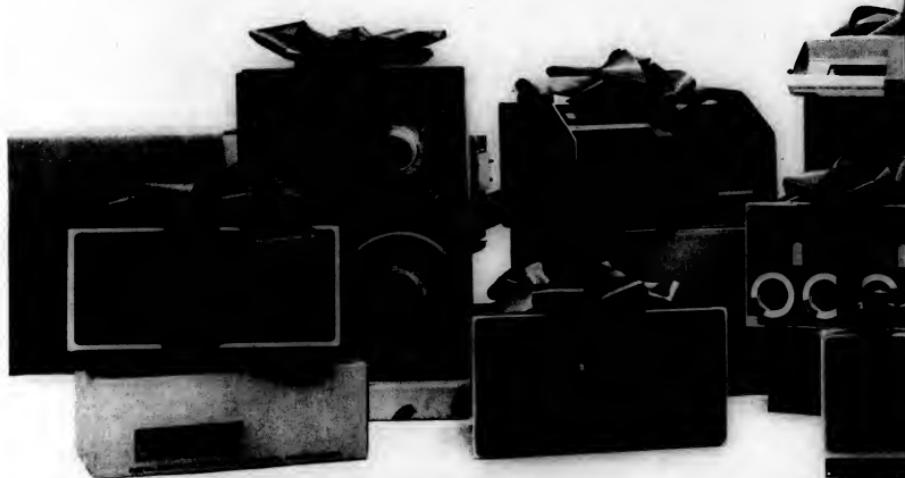
And that's not all. We've created different kinds of media for specific jobs. So we offer translucent paper, natural tracing paper, and transparencient tracing paper (with an optional drafting surface for fast, clean, measures, or additional drafting requirements). As well as HERCULEN films (for permanent records and sharp reproduction). And scientific and medical films for coordination graphs.

We'll also supply pens, inks, and pen cleaners—all specially designed to eliminate plotting problems.

And if you need special media or options, we'll make them for you in 1, 2, 3, 4, or 5 colors. And repeats up to 54". Talk to your K&E representative. Or contact Keuffel & Esser Co., 20 Whippley Road, Morristown, N.J. 07960.

KEUFFEL & ESSER CO.

60 Christmas gift ideas



Give your PDP-8, 8/L or 8/I the newest technology. Like some memory. Or discs. Or magtape units. Or line printers. Paper tape reader/punch. Communications equipment. A/D converters. Cassettes. DECwriters. CRT

displays. Or what have you.

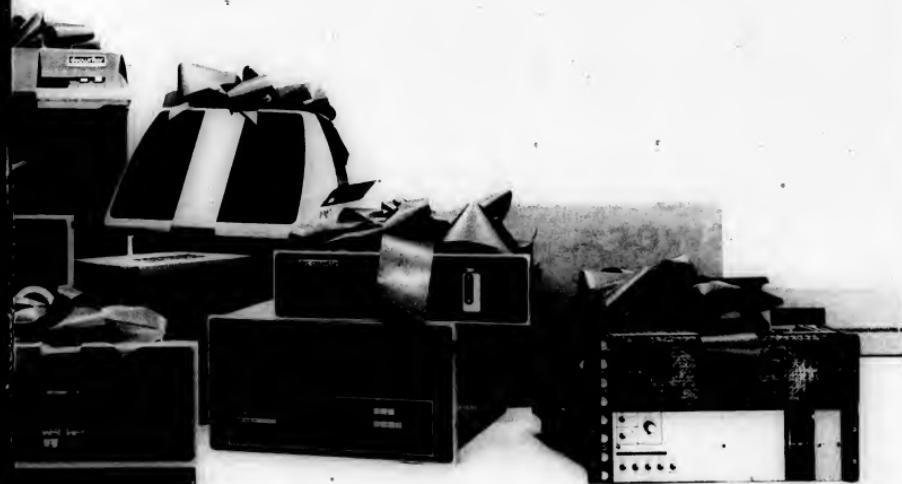
Whatever you get will come with all the power supplies, cables, modules, prints, bits and pieces you'll need.

And we've brought down the prices by as much as 50%. You'll get the same kind of

delivery, installation, support, software and warranties that brought you to Digital in the first place.

That's what happens when you buy Digital. You get a whole group of us whose only job is supporting people who

for a 3-year-old PDP-8.



already have our computers.

Return this coupon or call us at (617) 897-5111, ext. 2787 or 2058 and ask for Bob Reed. Digital Equipment Corporation, 146 Main St., Maynard, Mass. 01754. Attn: Traditional Products Group.

Yes I own a PDP-8 that I might consider expanding.
Please send me all the facts or call me at:

Name _____
Title _____
Company _____ Phone _____
Address _____
City _____ State _____ Zip _____
Present System _____

Plan to attend DECUS, November 29-December 2, Royal Inn Hotel, Anaheim, California.

digital

Despite Decreased Budgets

DP Use in 'Information Centers' Makes Great Strides

By Michael Merritt

Special to Computerworld

ANAHEIM - Despite budget crunches and lack of strong mainframe manufacturer interest in the application of computers to library problems, its development is progressing rapidly, in both theoretical and practical ways. This was the overall impression of an FJCC User Application Seminar on Computers in Information Centers - Computers in computerized libraries.

The 16 papers presented at the all-day session displayed the depth and breadth of the last 15 years' efforts in analyzing problems connected with using libraries - studies in techniques and methods of acquisition and cataloging, system analysis and system design criteria to maximize end-user effectiveness.

The session also saw described a number of working systems which demonstrated the usefulness, problems and cost effectiveness of computerized library functions.

The most comprehensive system described was one now at Stanford University. In its first stages of implementation, it already supports the acquisition and cataloging functions of the university's libraries.

Stanford's Ballots (Bibliographic Automation of Large Library Operations using

Looking at Libraries

A Time-Sharing System) is an on-line, interactive system, using Sanders 804 processors and a GE 6400 system, a \$60K-7. In the words of Alan Vener, one of the designers of the system, it takes care of books from the publisher's warehouse to access by end user.

The system automatically creates purchase orders, sends card sets, book labels, various file slips and several management reports. It permits an operator

to search a file to see whether requested book is already owned by the library and provides several different searching indexes - author's name, words in the title, etc.

Hank Epstein of Stanford, another designer, said the system has had an average response time of two seconds to execute with 40 to 60 terminals online. This is due in part to the use of programmable terminals, which are loaded from a PDP-8/I between the terminals and the 360, he said.

Design Criteria

Motivating a user to use the system - especially if he is leery of computers - is a major requirement of system design, according to Mary Elizabeth Stevens, a lessor theorist and consultant to the field, formerly of the National Bureau of Standards. Stevens listed a number of ways in which an on-line retrieval system should be responsive to

users:

- The system must be easy to use. The display format must be natural, and the system should use an understandable language or mnemonics, rather than arabic numerals.

- There should be an easy way to expand the system.

- Output should be easy to obtain.

- There should be simple means of inserting and deleting information.

- It should be easy to learn to use the system - and designers should seek to standardize on the same programming languages and control instructions.

There should be user facilities - a way to call for help, "please wait" notices during lengthy searches, and status information such as file dates, and the number of other users on the system. Another equally important question to the user, Stevens said, is the quality of the file. It is necessary to know if there is missing, misleading or misspelled data.

Blocks System

There is a cheap way for libraries to keep a constant, on-line track of where their books are, according to Michael Smith of Bucknell University. His system, Blocks (Bucknell University Online Circulation System), uses a combination of tape and disk storage to put information into a PDP-8, which maintains a journal file of outstanding books, as well as hold requests, on a Sytek Datatronic tape cassette drive. The system is also tied into the university's digital library.

Smith said his staff had done all the programming for the mini-based system, including the writing of an executive for the PDP-8. Yet total implementation cost for both hardware and software, exclusive of the Sigma 360/70, and disk and operating costs, again exclusive of mainframe charges, were \$8,000 a year.

As well as keeping track of the books, the system permits generation of a number of statistical analyses for management reporting. Block's on-line retrieval time and user classification (undergraduate, graduate, faculty) are possible; one can find out which books an individual user has outstanding and see which types of book are in demand.

Smith added, it would also be possible to find out which books an individual had been reading over a period of time, "if you could get the director of libraries to let you do it."

Mink's Answer?

A library encounters unique difficulties in trying to use a large shared computer, according to Andrew Grosch of the University of Minnesota. The problems she mentioned included:

- Excessive core requirements for a multiprocessing environment.
- Requirements for unavailability direct access storage.

- Need for extended character sets on printers.
- Need for on-line data entry.
- Need for frequent batch runs.
- High mass storage costs.
- Poor understanding of library needs by computer center programmers.

Rather than to contend with these problems in a computer center environment, Grosch said, a team at the Minnesota Bio-Medical Library is now designing a stand-alone system. But rather than use a mainframe computer, with an estimated cost of \$2 million to \$3 million, the Minnesota are implementing a mini-computer system.

A powerful mini with 12 terminals, 320M bytes of mass storage, tape and printer capability, and a 100M byte disk, which, each serving one local library in the university, would cost about \$1.3 million, and take care of all the university's needs except for the central main library.

(Continued on Page 17)

Here are 12 questions you may have to answer (and the facts you need to answer them).

What is Easytrieve? Easytrieve is an easy-to-use information retrieval, file maintenance, and report generation system written for the IBM Systems 360/370 and RCA Series 70.

How is Easytrieve used? A few punched cards or a free form English statement is input to your card reader. These cards become simple parameters to the Easytrieve program which, in turn, immediately executes against any of your data base files.

Are any special forms or coding skills necessary? No. You can even write your first Easytrieve program on the margin of this ad!

Is it necessary to "compile" or "assemble" when using Easytrieve? Never. Easytrieve is a "load and go" system.

Can Easytrieve process files that contain different record formats? Yes.

What kinds of outputs will Easytrieve generate? It will produce:

1. Automatically centered and formatted reports on up to five keys with subtotals on up to five different levels.
2. Automatically formatted mailing labels with complete flexibility regarding number across, size and shape.
3. Test files on cards, disk or tape. You can select every Nth record, reblock, sort, merge, lengthen, shorten, size, and reformat records.
4. Test cards (automatically or user formatted), and
5. Multiple output subroutines and/or reports from a single pass of a master file.

How fast is Easytrieve? Easytrieve operates at I/O speed. It normally executes 3 to 4 times faster than tailored COBOL programs, and executes

faster than most assembler programs written for general or specific applications.

How much core does Easytrieve require? It requires 24K DOS and 45K for OS.

How much specialized training do Easytrieve users need? Since Easytrieve has English language statements, non-technical users can learn the basic tasks with just a few hours training. Trained programmers need only a brief introduction to Easytrieve's capabilities.

Is Easytrieve available on a free trial basis? Yes. A demonstration on an introductory training session, and a 30 day trial are free and without obligation to prospective users.

How does Easytrieve compare in price to packages of similar size? We sell about half the price of most comparable packages, yet it has more features and capabilities than many of its higher priced competitors. The single-file-input version sells for \$4,800, while the multi-file-input version sells for \$8,000. Lease arrangements are available for both versions.

What's the best way to take advantage of the free trial offer? Fill out the form below and mail it to our corporate headquarters in Silver Spring, Maryland. We'll arrange to have our local representative demonstrate the Easytrieve retrieval and reporting system on your computer and leave it with you for testing.

RIBEK Corporation
Montgomery Center
6330 Fenton Street, Suite 815
Silver Spring, Maryland 20910
Phone: (301) 587-0115

Name	_____			
Title	_____	Computer System		
Employer	_____			
Street	_____			
City	_____	State	_____	Zip
Business Telephone	_____	Date	_____	



DP Solving Library Problems With New Methods

(Continued from Page 16)

This would give the designers an extra \$700,000 to \$1.7 million to spend on software, Grusich indicated.

She added, though, that no mini manufacturer currently provides an acceptable real-time disk operating system, and that the Minnesota team will design its own, though it will use a vendor-supplied system during the first design phase. "It's a real problem," she said. "Thearies are not now using minicomputers is the need to do their own programming."

The Minnesota system will provide all normal library functions, including acquisition, accounting, serials control and circulation.

Many Data Bases Available

The session did not confine itself solely to computers in traditional libraries.



Joe Ann Clifton of Litton Industries chairs session.

There was also emphasis on technical libraries and data bases.

The Federal Environmental Protection Agency has several libraries that maintain about 45 computerized data bases on a wide range of environmental, physical, toxicological, chemical and economic matters. Although the data bases are primarily bibliographies, there are also some data bases, such as one on solid waste disposal.

Maintenance, or How Experts Save the Day

By Michael Weinstein

Or the CW Staff

ANAHEIM — Most panel sessions on maintenance usually start with lofty pronouncements of the need for more services and support. Then the talks on how manufacturers get their expert customer engineers to the user's computer and save the day, or equally lengthy discussions of user experiences which generally don't relate to other users.

The FJCC session on "Maintenance and System Support" was no exception.

Bob Fitzsimmons of IBM highlighted the session speaking about IBM's Retain system for providing maintenance for the System 370 user.

Under this system various information clearinghouses are set up across the nation to help the individual computer engineer if he runs into problems. At the base of this service is a data base of all problems reported for all types of IBM 370 equipment.

If a CE reports a symptom, the engineer at the central station can access the data base to determine the cause and determine whether a similar problem has occurred. If the problem reported is in fact a repeat, a history of all corrective action is available for the CE.

The second feature implemented is to identify the failing user's computer to a central system so experts at that center can run diagnostics on-line.

As a third source of information, manuals are recorded on microfiche so that information is easily retrievable.

On more than one occasion is IBM's participation in maintenance for 360 users. When asked whether the same data base and services were being compiled for System 360 users, Fitzsimmons replied that they were but not with the same effort as for the 370 line.

"Our one criterion has been cheap," according to Morton Friedman of the agency's Clinton National Environmental Research Center. He detailed the way the center is able to access such a wide range of information at very low cost — primarily by accessing existing bases on a use-on-a-basis. His staff of 13 librarians now averages about 20 searches a week, he said. The results, he said, Friedman said. He expects the rate to plateau at about 200 searches a month.

Friedman also mentioned the problem of a young agency just getting started in a new field. "We don't even know to which data base we want to have access yet," he said.

Software Library

"There is an information gap in software distribution," according to Robert Panek, who described the computerized file of software routines used at North Am-

erican Rockwell, NAR, a very large user, has not yet for the writing of many programs, but does not have the organization of existing programs are sometimes created because nobody knows an original already exists.

NAR's solution is to use Tips — Technical Information Processing System, according to Panek. It is a file of scientific software packages indexed by descriptive terms (i.e. Center of Gravity for a program that calculates a center of gravity), author's name, program title, document number, contract number and accession number. These files, compiled from 13 NAR libraries, are available to engineers and managers.

In 15 months' use, Panek said, there have been 12 known usages of programs discovered through the system. He estimated that writing these programs from scratch would cost over \$40,000.

Auto-Indexing

Stella Keenan, executive director of the

National Federation of Abstracting and Indexing Services, outlined the recent history of current developments in problems of automatic indexing and automatic language processing — enabling a computer to generate indexes from raw input data by itself. She indicated there would soon be a marriage between the efforts of library people, computer problems, and actual system users.

She pointed out the costs of getting information from scholarly papers into computers may soon drop drastically due to the increasing use of automated typesetting by journals. The tapes for running typesetting programs can be read directly by computers, she noted.

This lower cost, coupled with lower hardware costs, spells a radical change in on-line data bases, she said. Rather than maintaining just bibliographic files, it may be feasible to maintain files of actual data — texts of papers rather than citations or abstracts. This results in a system that can give answers rather than bibliographies, she said.

We helped convert the Cleveland Trust.



Going from DOS to OS isn't exactly a heavenly passage.

But DUO 360/370, UCC's exclusive conversion software, can help you pass the way.

Look at how Ben Lechowicz, Assistant VP of Systems Support of the Cleveland Trust Company put it: "We were maybe four months into OS and pretty green when we took DUO. The weekend we installed it, one of the people in operations coded an application, we catalogued it on the OS system and ran it right off in a matter of eight or nine hours. I was convinced."

With DUO you run your DOS programs under OS control without re-programming! You simply link edit to your DOS object programs, so that DOS jobs reside as OS load modules. They then have full access to the speed and features of OS.

"Only one very intricate application of ours had to be re-written immediately," said Jerry McElhatton, V.P. of Information

Services. "The remainder have been converted without tying up a lot of high-priced talent. Today, only a handful of programs are still in DOS."

Let us give you the full story, call me, Sterling Williams, Product Manager—Special Products, at (214) 637-5010, or mail this coupon now, before you make any other deal.

We wouldn't want you to get burned.

UCC

UNIVERSITY COMPUTING COMPANY

800 UCC Tower P.O. Box 47911, Dallas, Texas 75247

Mr. Williams,
DUO 360/370 may be my salvation. Please rush me:

more information someone to talk to

Name _____

Firm/Title _____

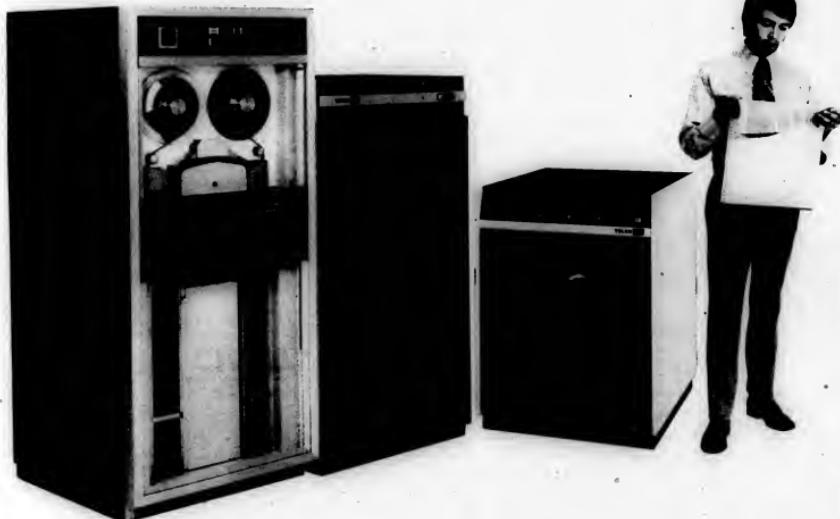
Address _____

City/State/Zip _____

Phone _____

TELEX Off-Line Printer System

One of a broad spectrum of TELEX Peripherals . . .
Tape Drives, Disk Drives, Printers and Memories.



SO MUCH...

A proven TELEX Train Printer with 1200 LPM speed, outstanding print quality and superior multi-part copy capability—the same TELEX unit that replaces the 1403NI on-line—with superior quality—now in an off-line package.

A proven TELEX Controller...a programmable mini-computer in itself for total format flexibility.

A fully maintained system with 24 hours a day, seven days a week service from the industry's No. 1 field service network...included in the basic monthly rental.

A system with unlimited usage...there's never an overtime or extra shift usage charge applied to any TELEX products.

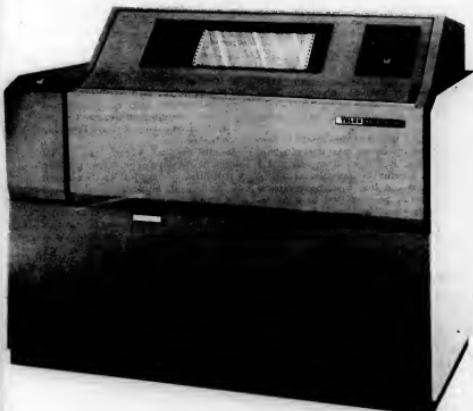
A new standard for off-line printing systems...frees system partitions for other processing and totally eliminates computers dedicated to printing.

FOR SO LITTLE! \$15.88 PER MONTH

Complete system including full maintenance...

1 TELEX Tape Drive, 1 TELEX Tape Adapter, 1 TELEX Controller and 1 TELEX Printer, 24 Month Fixed Commitment Plan

You'll get the full story from your TELEX representative. Or call or write us.



where the difference begins

TELEX
the PERIPHERAL COMPANY

TELEX COMPUTER PRODUCTS, INC.
6422 East 41st Street • Tulsa, Oklahoma 74105 • (918) 657-1111

TELEX, LTD.
101 Duncan Mill • Don Mills, Ontario, Canada • (416) 445-8050

TELEX EUROPEAN GROUP
213 Oxford Street • London W1R 1AH, England • 01 734 9101
Paris • Frankfurt • Zurich

Editorial**Stalled Satellite**

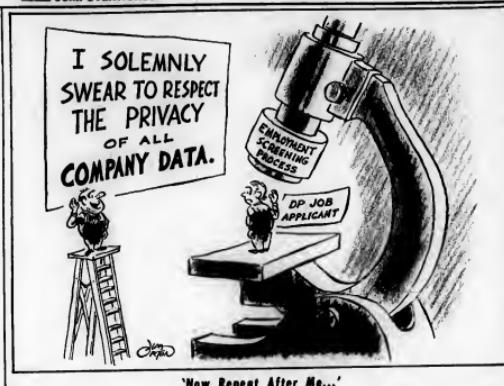
U.S. data users may soon be accessing satellite channels provided by Canada.

This is certainly a commendable display of cooperation with our neighbors to the north. But at the same time it focuses on the regulatory delays and red tape that often seem so insurmountable to the end user.

It is well within the state of current technologies for the U.S. to operate a domestic satellite system. And the economics of such a venture have been adequately determined by current applicants to the Federal Communications Commission. So why the delay?

The absurdity of the current situation is clear: we may have to pay foreigners to use a satellite that was launched by our own expertise in Florida.

An operational domestic satellite system to augment existing land-based facilities deserves top priority and an early decision from the FCC.

**Letters to the Editor****English Documentation Should Be Abandoned**

Several letters in Computerworld over the last two months have advocated scrapping Cobol. The major reasons are that it is verbose, has an irregular syntax and encourages bad programming practice. It is noted that better languages are available.

However, when we examine Cobol with respect to the context of total systems, it is obvious that the costs of writing Cobol source code, as well as the volume of language produced, are insignificant for normal-sized programs.

The real point is English used in feasibility studies, functional descriptions, programming specifications, program annotation, users' guides and operations manuals.

Why should we continue to use English with its irregular grammar and inconsistent orthography? English encourages ambiguity and other bad linguistic practice.

Since Esperanto can be demonstrated to be sufficient for technical documentation, does it not make sense to abandon English for documenting all new development? (It could, of course, be retained in our inventory for a few years for existing systems.)

If the Federal Government merely stops insisting that its documentation be in English and if minimal effort is devoted to Esperanto standardization, the rationale for English will disappear.

Obviously, a programmer or analyst who lacks the intellectual capability to master English and documentation languages has no more place in our society than the person who knows only Cobol as a programming language.

James J. Pottmeyer

Arlington, Va.

Standardized Assembler Would Help But...

Re: Thomas K. Tate's letter in the Nov. 22 issue, standardizing assembly language at Cobol placement.

While I grant that a standardized assembler would be a great help in building up libraries and is something that should be done, I have the following objections to making it the rule:

- Standardized languages are machine-tied by their nature. Direct interchange is almost impossible between two machines with different word size, different firmware, etc. without very fancy microprograms. If you are going to do this kind

of thing, why not use compilers?

• Improvements in a machine language will mean redoing the library. For example, if my computer gets multiply-coded circuit boards for Christmas, I have to go through the assembler library and rewrite those parts of my programs that have the software for the wrong board (or worse, for side effects from the wrong chip). Or I can write a routine that will edit the library for me – another simple compiler-like device.

The same thing may be said about new storage devices and their write routines, etc.

Yet, with a high-level language, I just change the compiler and let the machine take care of what needs doing.

• High-level languages can optimize code better than assembly. I have seen committees that put together some compilers had specialists to work on the best way to handle arrays, lists, etc. I don't feel you should expect one man to have a Master's thesis-level knowledge in all areas of assembly language before you let him write a program.

• We are getting better programmers today. High school kids in introductory classes are getting terminal experience in many places in this country. You can reasonably expect that within 10 years or so that they will be able to use and understand very sophisticated high-level languages – having worked with them since age 15.

You can also expect that machine-time costs will go down as technology advances. I don't see how assembly languages could actually be cheaper to use (machine time vs. people time) and be as good as or better than the average assembly program.

Joe Celko

Atlanta, Ga.

Arena Scheduling Requires Too Much Student Time

Alan Taylor's article on Arena scheduling [CW, Nov. 15] covered many of the potential advantages of a technique for scheduling student time-spaces, classrooms. In my opinion, Arena scheduling has some real advantages, but it is unfair to leave the impression that this technique is an unmitigated blessing.

My primary objection to this type of scheduling is that it requires a large amount of time by students and staff to accomplish this task. This time comes out of the approximately 180 days of education in the academic year.

Too much time is being subtracted from education today in the form of half

days, student assemblies, review of material previously covered, and the like.

Further objections include:

- Balancing of course sections is uncontrollable. Does better education result from having 30 students per class for popular teachers and 10 students per class for unpopular teachers?

- Any student scheduled later in the process, receives far fewer opportunities than a student scheduled earlier. Is this really democratic?

- Today's sophisticated computer scheduling techniques permit special choices, such as scheduling a student's part-time job, so Arena scheduling is unnecessary for this purpose.

- Arena scheduling does not overcome the fact that some teachers are unpopular. I would like to emphasize that a popular teacher may well earn his reputation by grading easily and assigning light assignments in addition to being an outstanding pedagog.

- Most, if not all, of the alleged benefits of Arena scheduling are possible with today's conventional computer-scheduling techniques without the chaos and time loss implied by the "mad scramble," which I, along with Alan Taylor, envision.

Perhaps I should confess a bias or two. I am a fan of Arena scheduling and do a great deal of school scheduling. It follows from this that I discern benefits in sophisticated school scheduling and that I believe computer systems can be developed to make increasingly wiser "decisions."

David W. Chaffin

President

Applied Data Processing

North Haven, Conn.

Looking Backward?

The article by Alan Taylor entitled "Scheduling System Did Less Work, Had Better Results" [CW, Nov. 15] was confusing and imprecise.

Arena scheduling is over 20 years old. It does not depend on the local computer. Arena typically individual programs were originally designed for EAM equipment.

There are certainly many systems that combine the advantages of Arena scheduling with computer efficiency. An endorsement of Arena scheduling by Ted will, I hope, not lead us back in time rather than proceeding toward more flexi-

ble, effective methods of scheduling. Joseph A. Domar

Assistant Director

Office of Admissions and Records

University of Minnesota

Minneapolis, Minnesota

Independent in Canada

Re: Random Notes [CW, Nov. 8].

Data Logic Canada Ltd. provides Mark IV service as a completely independent Canadian company which has purchased two British computer systems.

Although Data Logic offers parallel Mark IV services in Canada, it is not in any way an agent of Informatics; rather, we are keen competitors for the rapidly growing Canadian market for Mark IV education, processing and contract programming services.

J. R. Edmundson

President

Data Logic Canada Ltd.

Ottawa, Ontario

A DPer in Politics?

The Nov. 15 issue of *Computerworld* contained an article on "Systems Analyst Looks at DP Candidate," entitled Redford, Ill.

Please! We have had a bad enough time with our state highway department – it refuses to put us on the map because we are a township rather than an incorporated city. But you did even worse – you put us in the wrong state! Redford Township is in Michigan.

Despite the fact we are over 75,000 strong in our population, we do not have a post office of our own. We are a branch of the Detroit, Mich., post office, and the reason is that if we were a city we would be the 157th largest in the state!

As far as Ralph Judd losing the election to Martha Griffiths, I can only say a computer man does not necessarily make a good politician. And that an entire group of computer people in Congress who know computers? There certainly must be more to being a representative than that!

It is also interesting to note that Judd was stated to be a certified data processing system analyst – yet he is not on the latest rolls of the local DPMA chapter. I know he does not have to belong to DPMA to receive the CDP – but my question remains: "Does he have a CDP Certificate?" He did not use capitalized words in his reports, so if he is not a CDP, then he should not imply that he is.

James E. Taylor

Redford Township, Mich.

Attack on SDE Certification May Have Backfired

"Have you seen and taken the (Society of Data Educators') examination for the Certificate in Data Education (CDE)? I took the first one and found it bad and severe respects. Typos were prevalent."

Some questions tested knowledge of particular computers and operating systems (IBM). The author understood neither facility nor discrimination indices. Little normative data indicates for the examination."

"Also, you might like to look at 'Data Education,' the society's journal. I doubt it will meet your standards."

"Enclosed is a copy of the first CDE examination together with my comments."

The above statement came from an individual connected with the CDE certification program (and who asked not to be identified). The statement came to me after I had reported on the SDE's CDE certification, and how it offers an alternative style of certification to the CDP certification.

Basic Concepts

The CDE is based on the concept that practitioners are entitled to certification if they cannot be proven ignorant or dangerous; while university exams and CDP exams are based more on the concept that one should be examined for an examination period.

This individual, whom I'll call Mr. X, is connected with the CDP examination, and was apparently writing in defense of its particular operation, and one doing so indirectly by attacking the opposition rather than by showing the strengths of the CDP exam.

Did Mr. X contradict my discussion of the differences in the two examination philosophies. Because his charges are interesting, it would be worth while to look at them.

Charges Examined

"I took the first one and found it bad and severe respects."

Perhaps so – but why object without checking up on the later situation? Should we judge the Registered Business Programmers Examination by the fiascos involved in its debut? The 1972 CDP, by the 1965 original, X, I would be the first person to object to such a method of operation. Why then should he use such an attack? I don't know – but let us see what further detail he has to back up his description of the examination.

"Typos were prevalent."

This certainly was unfortunate – but it happens in the best examinations. It can easily be remedied, so I do not feel that this is a valid point when considering the alternative examination philosophies. I would be worried if I were considering the results of a specific examination, but that is not what is being considered.

The Taylor Report

By Alan Taylor, CDP



"Some questions tested knowledge of particular computers and operating systems (IBM). The author understood neither facility nor discrimination indices. Little normative data indicates for the examination."

Of course, Mr. X may be trying to react to my reputed anti-IBM attitude. Sorry, but I want quality, real education – and that includes teacher-knowledge of IBM.

Does Author Understand?

"The author understood neither difficulty nor discrimination indices."

How awful – if true! I wonder if Mr. X knows the author? I wonder what evidence he has to offer? He grants none in his letter, and the 13 pages of attachments, all of which I have gone through carefully.

More importantly, however – beyond giving employment to some of the most mediocre educational institutions – does Mr. X understand whether these measures of some types of examinations are important to this type of examination – a floor-level certification examination for a DP teacher already in practice?

That is not the question – and I know of no reason to suspect that any such validity has yet been established. When it has been, I have no doubt whatsoever that the Society of Data Education will be happy to add its weight and present an examination where grading can be so measured. Until then, however, I cannot see that Mr. X has done anything to prove the examination faulty.

Incidentally, although not being a computer specialist in the evaluation of examinations, I do question whether there have been some serious objections raised to the reliance on the use of such validation techniques.

Little Data Available

"Little normative data is available for the examination."

Very interesting. But still less is available for the older CDP examination. True, members of the Certification Council have "done" long validations of difficulty and discrimination data – but these do not include content validation studies, nor are they available for outside study and comment. The charge that there is validation data, but it seems to me at best a case of "the pot calling the kettle black!"

SDS Journal up to Standard?

After his attack on the SDE examination, which only serves to illustrate the value of encouraging alternative forms of certification (as well as those like the CDP), Mr. X changes targets, and brings up *Data Education*.

I had mentioned the publication, in my original article,

noting that the SDE does insist on CDE applicants – at least taking *Data Education* for a year, and so does help to encourage them to stay up-to-date in the field.

By contrast, the CDP authorities make no such effort, unless one includes releasing lists of CDP holders to local DPMA chapters as positive new member "perks" – such as "encouraging practitioners."

"Also you might like to look at *Data Education*, the society's journal. I doubt it will meet your standards."

I have noticed the application that I have just looked at *Data Education* – apparently because I had not found it necessary to men-

tion a study in Groton, N.Y., which showed that justification for a degree in a DP program was not to be found in the local business need a 20-frame exercise, a 14-page directory of films for DP education, and so on.

DP Education Concentration

Well, Mr. X? "What is not to my standards there?" Perhaps you think that some of the material is not advanced enough? Not dealing with the future of virtual distributed machines? Or the functions of Cadas?

True, I would like to see some of the DP education – but I can hardly ask the editors to concentrate upon my specialty

"Attacks like this one on the SDE certification method reveal more about the weaknesses of the certification methods Mr. X is connected with than they do about the weaknesses of the alternative SDE-style of practitioner certification."

tion anything about such an investigation when talking about certification matters. Sorry to disappoint you, Mr. X – I had done my homework before I wrote.

But, just to convince myself, I have just taken from my files a randomly chosen *Data Education* copy. It happens to be fairly recent, but not the latest by any means. It is the May 1973 issue. Let's look over the contents together so we can see just what that comment about my standards really means.

Data Education, one must understand from the start, is for the practicing DP user. What is important to professionals is whether the journal helps DP teachers keep up to date.

The first article in the journal is a feature on Ajax High School in Toronto, This school is representative of a spreading educational philosophy allowing students to pick their own courses.

The article shows that in such circumstances the computer can carry out a double role – helping with the increased advertising chores, as well as being available for use in the DP classroom.

The article gives a nice case history which can be used to justify the expansion or initiation of a computer curriculum. I give the editor of *Data Education* my hearty thanks for including the article.

Then a Professor Featheringham, of Central Michigan University, discusses the comparative merits of programmed instruction, tape cassette based, and computer-controlled instruction for the separate disciplines of console operator, programmer and systems analyst training.

Here we have some excellent pointers as to what can be used to stimulate interest and to gain recognition that training for a console operator is not a subset of training for a programmer.

I wish that the DPMA/Certification Council would take some of these truths to heart when designing study guides for the RBP and CDP examinations. Again, the editors get 10 points out of 10.

The rest of the journal is equally interesting – a staff account of the Soft Copy Conference and Research; a report

on a study in Groton, N.Y., which showed that justification for a degree in a DP program was not to be found in the local business need a 20-frame exercise, a 14-page directory of films for DP education, and so on.

and respect your intelligence.

But I do not think that you have a true alternative method of certi-

fication.

I think you believe that the

only certification methods of

value are university-style, or the

CDP style.

Here the aim is to forecast future capabilities based upon present training. The CDP, for instance, is an attempt to forecast the potential of a data processor who has been in the industry for five years to be promoted to DP manager.

The DSE qualification, however, is a recognition of current capabilities, rather than a forecast of potential. It is a very different, and, in my view, sorely needed certification, and one which should be respected. Having it around will strengthen the CDP rather than weaken it.

Attacks like this one on the SDE certification method reveal more about the weaknesses of the certification methods Mr. X is connected with than they do about the weaknesses of the alternative SDE-style of practitioner certification.

(Readers are invited to contact SDE for subscription, membership or certification data can do so at SDE, RR2/76 Union, Northfield, VT 05663.)

© Copyright 1972 Alan Taylor. Reprinted from *Data Education*, a publication of Sanders Associates, Inc. Limited numbers of copies for non-commercial use may be reproduced provided they carry this copyright notice. The views expressed in this column do not necessarily reflect those of Computerworld.

I value your interest, Mr. X.

The Computer Caravan welcomes



SANDERS
DATA SYSTEMS, INC.

A Subsidiary of Sanders Associates, Inc.

as an exhibitor in the 1973 Spring Caravan

Sanders Data Systems, Inc. will exhibit and demonstrate both their 804 stand-alone and 810 cluster display terminal systems using standard software packages for remote job entry and on-line data entry and inquiry for business and industrial applications during the Computer Caravan.

The 810 system features a disk memory which can provide up to a five-million bit capacity, while the 804 series has a tape cassette transport for smaller applications. Both systems will be seen in operation with 32 character-per-second and 200 line-per-minute printers, and a card reader.

What may we say about your company?

Call us: (417) 322-5808

The Computer Caravan/73

sponsored by

COMPUTERWORLD

Boston • Washington • New York • Atlanta • Houston • Anaheim • San Francisco
• Kansas City • Chicago • Cleveland



Special Services Increasing

ANAHEIM—Some users of computerized medical systems in Orange County, Calif., have gone beyond patient care systems and are providing some special community services.

Gerald C. Brady, analyst programmer in the medical informatics unit at the University of California, Irvine (UCI), told a special panel on medicine and health of a computerized research project in the cardiac-pulmonary section to help return to work people who have suffered a heart attack.

Brady described a computer evaluation unit which uses a minicomputer to evaluate six patient functions.

For example, a computerized walking machine is used which makes walking increasingly difficult for the patient and measures his energy output.

Brady also told the panel that the related station carries with him to monitor his heart activity, and the data is then evaluated by a computer.

He said future projects include working with the orthopedics section of the

Department of Medicine to compare patient activity before and after hip and knee surgery.

See Ungerman, moderator for the panel and biostatistician for regional medical programs at UCI, reported on a study of stroke patients that led to the discovery of the deterioration of stroke patients after they were released from the hospital. As a result, volunteers were recruited to help the stroke victims.

She also told the panel agencies for the community based on a computer to facilitate responses to inquiries from people in the community seeking help.

Donald A. Dennis, coordinator of medical education at St. Joseph's Hospital, Orange, told of an effort to analyze patterns of patient care by computer.

Meetings are held with the physician at his office to practice him how to analyze his own practice with his own data.

Medical Applications Range From Prevention to Discharge

By Marvin Smalheiser
CW Correspondent

ANAHEIM—Four computerized medical applications, ranging from preventive medicine to a shock therapy system for patient discharge summaries were presented at an FCC technical seminar on health and medicine.

A new computer program called *Prospec-Medicine*, designed to identify potential health dangers before they actually become problems was presented by Dr. Charles Ross, president of Interhealth, San Diego.

The *Prospec-Medicine* program is based on information gathered about the history of a disease, its thrust, its starting point, and the risk of death to a particular person based on personal characteristics and habits.

Ross said the program takes any kind of input, analyzes the various factors and suggests intervention procedures to prevent a disease before it occurs.

Dr. Norman Neches of Maimonides Medical Center, Brooklyn, N.Y., told of a pilot, off-line system based on a series of computer programs to create, store and retrieve patient discharge summaries.

"The system can produce periodic reports for the evaluation of the experience of any specific clinical department. A brief summary of the patient's history, the number of admissions and discharges, average length of stay, a compendium of all diagnoses, medical and surgical procedures and complications seen during the time period may all be obtained easily, he said.

Dr. William Hetvey of Technicon Corp., Mountain View, Calif., told of Medical Information System I, a system now fully operational at El Camino Hospital, Mountain View. The system puts the entire 440-bed hospital on a computerized patient-care system.

It consists of 54 video terminals with light pens, and about 25 electrostatic printers in the hospital, all connected to a 370/45 with seven disk drives located three miles away.

Patient security is protected, he said, by a private key which allows physicians access to information. It is set up to allow other personnel to get limited information appropriate to their tasks.

Howard Carrington of the Center for the Critically Ill, Hollywood Presbyterian Hospital, Los Angeles, described developmental research underway at a two-bed shock therapy installation that is fully computerized.

Systems Vendors Must Educate Users

Special to Computerworld

ANAHEIM—If the computer is to penetrate the medical world to the benefit of the user and the patient, the industry will have to do a better job of its education programs that will educate the user, according to Dr. Michael A. Jenkins of the Computer Medicine Department of the Office of the U.S. Surgeon General.

In a keynote address at the opening session of the day-long conference on *Computers in Medicine*, Jenkins urged data processors to make a stronger effort to educate hospital personnel and maintain a dialogue with them.

Jenkins, who is president of the Society of Computer Medicine, said the computer vendors should go through repeated "see and tell" sessions. "What is needed is critical analysis of what is good and bad about a system."

Computer penetration in the medicine and health field, he said, has been "almost negligible" and he claimed the reason for the limited use is that buying units have not been defined.

Hospital Problems Underestimated

Special to Computerworld

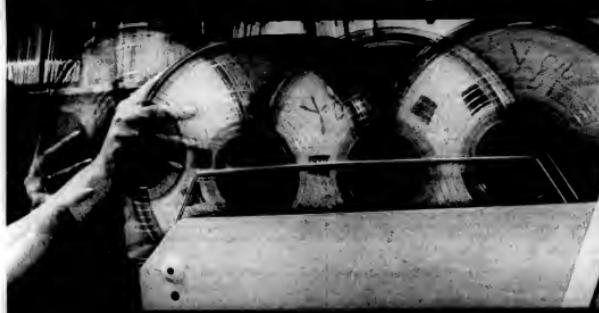
ANAHEIM—The data processing professional who has tried to serve hospitals has "littered the field with broken promises" because he underestimated the size of the problem, and he is still making the same mistake.

This was the consensus of a panel on hospital data processing at which data processors were urged to "find out what is going on in the hospital."

Gene Gumpert, panel moderator and chief of Hospital Information Systems, Department of Hospitals, Los Angeles County, said there was a "lack of meaningful communication with doctors and nurses."

Mark Buehner, chief systems analyst for California Health Data System Administrators, presented the other side of the picture: "Hospitals don't understand what is necessary or involved. They want to overlay the data processing system over the manual system."

Want more tape-storage capacity with your present canisters and library?



Here's our angle.

Four degrés.

That's Tilt Shelf's angle of incline. Tilt Shelf stores tapes in tandem, two deep, and our little 4° forward angle allows the second tape in each slot to roll quickly into a ready position when the front tape is pulled.

But the angle is just a sidelight; the big story is two-deep tandem storage. Because of that, Tilt Shelf can almost double your tape-storage capacity by using one storage shelf where you presently use two. That turns exactly 50% of your present, useless aisle space into working, profitable storage space. thereby increasing your storage-density, which speeds up filing and retrieval, which lowers your retrieval costs.

Another bonus: your most-frequently-used tapes naturally wind up at the front of each

slot, further increasing your efficiency. And, perhaps the biggest bonus—you don't have to change canisters when switching to Tilt Shelf.

So—our angle can cut your tape-storage and retrieval costs, boost efficiency, increase your tape library capacity without increasing your rent, and other things. For the complete story, contact your local TAB representative. Or, write TAB Products Company, 2690 Hanover Street, Palo Alto, California 94304.

We'll show you some more interesting angles.

TAB
PRODUCTS CO.

Stacked™ NSC 1972

WE HATE TO GET CANCELLATIONS TOO...

**Pershing
& Co.**

120 Broadway, New York, N.Y. 10005 Members, New York Stock Exchange, American Stock Exchange

October 30, 1972

Mr. Justin Spring
Software Design, Inc.
872 Hinckley Road
Burlingame, California 94010

Dear Justin:

I am pleased to report that the use of GRASP at our installation has resulted in such a dramatic increase in our throughput capabilities that we are now able to process our entire nightly DOS work load on a single CPU. An impressive demonstration of this capability occurred recently when we were forced to process our entire DOS and non-DOS work load on a single CPU for a period of six days with all work completed 100% on time.

The unfortunate result for you of this increased system capacity is that we no longer feel that it is necessary to use GRASP on our second CPU. Secondly, we would like you to adjust our monthly billing rate to reflect this. Please be assured that if this situation changes in the future, we will promptly notify you.

Yours truly,
Wayne Beardsley
Wayne Beardsley

WB/ep

... But we've published this one to show you the kind of results GRASP produces. What took two 360/50's to accomplish under DOS/POWER is now being done by just one 360/50 with DOS/GRASP II. If you use DOS, or are planning the use of DOS or DOS/VS, you should know all about GRASP.

GRASP FEATURES

- Automatic Wraparound Spooling
- Complete Job Accounting
- User Program Self-Relocatability
- Partition Priority Balancing
- Remote Batch Terminal Support
- 4th DOS Partition
- Resident Transit Area
- Automatic Volume Recognition
- Catalogued Procedures
- PCI Fetch
- Tape Spooling Support
- ... And Many Many More

Call or Write for Further Information

Please send information on GRASP to:

Name _____

Company _____

Address _____

City, State _____

Telephone _____

We have a 360/370 Model _____



SOFTWARE DESIGN, INC.

872 HINCKLEY ROAD
BURLINGAME, CALIFORNIA 94010
TELEPHONE: (415) 697-3660

On Designing Supercomputers

Careful Algorithm Analysis Can Mean Better Machines

By a CW Staff Writer

ANAHEIM, Calif. — Computer designers "could produce computers which are much more effective than present machines" by doing careful analysis of users' algorithms, David Kuck of the University of Illinois told an FJCC session on "Supercomputers."

By designing such supercomputers with the user's problems and operating procedures clearly in mind, the computer designer could build systems that were the biggest and fastest and most complex available, and at the same time make them useable by most users without extensive hardware and software backgrounds, Kuck indicated.

"It is also the designer's responsibility to consider new uses for machines, particularly in the non-computer file-processing area," Kuck said, indicating this would "make the benefits of supercomputers more directly available to ordi-

nary users."

Kuck said that even though many designers will push one configuration or method of operation as the "best way" to design all systems, "clearly there are many different computer/software configurations extant which serve quite different sets of users in reasonably acceptable ways."

Software Layers

The problems with today's system, Kuck claimed, are that many layers of software being used in an attempt to make general-purpose computers appear as a variety of special-purpose machines. "If steps were taken to automate the design of entire computer systems," he added, "it would be possible to incorporate these users' needs."

To reach the ideal goal, Kuck outlined what he felt were the computer designer's

goals and responsibilities.

These included a reduction in the use of high-cost components and subsystems in a machine while increasing the use of low-cost components and subsystems by data flow throughout a system by introducing concurrency into the designs.

In addition, Kuck said designers should measure user algorithms to determine system design and make all machines "extensible in their capabilities."

Kuck also stated that designers of computer systems should "incorporate new processing features into hardware to reduce programs," another move that would make super systems easy to use by the average potential user.

At the end, Kuck admitted "it is very easy (and hence quite common) for university professors to go around waving their arms and pontificating about how things should be."

"Every sensible computer person

knows it is not such people who determine what machines will come into common use, but rather market forces which do."

Because of this, he said, "paper and real machines conceived in universities, by users, and even in the back rooms of computer manufacturing establishments, are ignored."

He also noted a trend toward consolidation in the mainframe area and suggested that if the trend continues, the result could actually be less innovation than is now evident.

To overcome this, he said, there was a need for active consumerism on the part of the people who design computer systems.

"Perhaps the knowledgeable current users can clarify their demands and make them felt. Maybe ordinary users will realize what computers can do for themselves and press for the commercial availability of such computer services."

But if these moves on the part of designers and users fail in getting production of better and more cost-effective systems, then innovation in the business will be held back for decades to come, he concluded.

Simulation or Math Modeling? Perhaps A Mix Is The Best

By Edward J. Bride
Of the CW Staff

ANAHEIM — Simulation?

Computer designers, engineers and users held a two-hour debate on the merits of simulation vs. mathematical modeling in the FJCC, but the results were inconclusive.

Simulation provides a good way to predict a system's performance, most agreed, although simulation and mathematical modeling are recommended.

Thomas Bell of the Rand Corp. noted simulation does help predict when poor response will be introduced into a system, such as when too many I/O devices are added. It can also predict such things as message delays, lost data or the unresponsiveness of a system.

On the other hand, Alfred DeCegama advocated the use of mathematical models where more than four programs were being processed simultaneously. The NEC engineer suggested mathematical models are much faster than simulation, although he did concede that simulation is cheaper and faster to develop.

Anyone interested in predicting system performance, he noted, should assess just how many times the system would be used, and then choose — most likely — a mix of simulation and mathematical modeling as the more efficient approach.

While the audience was divided on which approach was better, session moderator Pauline Kivian, who is in the federal ADP Simulation Center, noted models can use feedback from measurement devices, whereas simulation can not.

People interested in simulation can help in systems design, Kivian commented, noting these people cannot help control systems through the method they advocated.

"We must close the loop," he said, "by taking measurements, and using them to control the system."

"Simulation is not useful here, but measurement can be used to feed back to mathematical models," he proposed.

Bell said that if simulation is chosen, then users must adhere to a set of rules headed by stating objectives of the simulation project — in writing. Then, consistency must be checked before design is continued.

Waiting for delivery of disk systems?



If you've ordered a disk system recently, better check on delivery. You may want to consider what System Industries can immediately offer.

What we're proposing is not a sale, not a gimmick. We're simply offering our standard production units, the Series 3500 Removable Disk Systems, at our standard prices. Ready to plug into a wide range of minis—DEC, Data General, Varian and others—these disk systems are available today, with their usual high levels of performance and reliability.

Here's what you get: A fully operational system, ready to use, which includes our proven 3010 Controller and power supply, a Diablo Model 30 Series Disk Drive and all necessary cables.

Here's when you get it: Because of our production experience and field proven system design, we can assure delivery within 30 days of your order. And we can do it at our standard prices—prices that may save you as much as \$3K per system. Or even more on a dual-drive system.

The quickest way to find out all the details about specs or prices is to pick up the phone and call Kent Winton at (408) 732-1650. Call collect if you wish, but call!

System Industries

535 Del Rey Avenue
Sunnyvale, California 94086

Dear Mr. Winton,	Date
I'd like more information about your Diablo Disk Systems for DEC mini's. Please provide the following:	
<input type="checkbox"/> Please at once with spec and price, my number is _____ <input type="checkbox"/> Have your nearest rep contact us at once. <input type="checkbox"/> Send descriptive literature, my name is _____ <input type="checkbox"/> Send descriptive literature, my name is _____	
Name _____	Title _____
Company _____	Address _____
City _____	State _____
Zip _____	

SOFTWARE & SERVICES

Random Notes

Modcomp Enhances Fortran, Cuts Execution Times 50%

FT. LAUDERDALE, Fla. — Modcomp Computer Systems' Fortran IV compiler for its minis and the new processor may, in some cases, enable users to cut previous execution times in half.

The additions optimize both the code generation and execution times of programs under the Modcomp, Max II and Max III operating systems, the company said.

One optional pass of the compiler optimizes subroutines calculations. In addition, direct-access file buffers are allocated dynamically at run time to reduce storage requirements without sacrificing execution speed. With the new software, performance of the 16-bit processor's 16-bit minis often matches that of many 32-bit machines, a spokesman claimed.

3330 Backup Operations Eased

By Using 'Fast Dump Restore'

FLANDERS, N.J. — Users of 3330 disk systems can now back up and gain better backup for their data files by dumping the disks to tape and restoring them with the Fast Dump Restore program for the 3330 (FDR3330) from Innovation Data Processing.

The package is said to operate up to five times faster and use 30% fewer tape and disk DCPs than standard OS/360 utilities.

As with the earlier FDR 2314 [CW, Aug. 9], this package also uses less tape space than the IBM utilities. FDR3330 can be purchased for \$990, through P.O. Drawer F, 07836.

On-Line Lumber Mart Planned

WELLESLEY, Mass. — By early 1973, lumber producers, importers, exporters and wholesalers in the U.S. and Canada will be able to link into the Lumber Trading Information System, a telecommunications CRT terminal, to swap information on current and future availability and demand.

The system will be implemented on Sigma 9 CPUs at Auteschillers, 55 William St., 02181, with concentrators in Chicago and other remote locations. Mills will be charged a monthly fee based on their rated capacity; wholesalers will pay a charge based on the number of mills in the system.

The Price Was Wrong

Less price for the time-sharing operating system from DTSS Inc., Hanover, N.H., [CW, Nov. 15], is \$750/mo. Prices in the original story covered both minimal hardware and the DTSS software.

Newsletter Draws 1,200 Users

Codasyl Ponders 'Associate' Members

By Don Leavitt
Of the CW Staff

MONROEVILLE, Pa. — The Codasyl newsletter has become a two-way link between the industry's hardware and software designers and, as a result, a new "associate membership" in the Conference on Data Systems Languages (Codasyl) may be established for users.

When the newsletter was started last summer [CW, Sept. 20], editor Gerald E. McKinzie said it was to let people know what Codasyl is and what it means. Since then, more than 1,200 users have "subscribed" to the free quarterly and generally let Codasyl know what is on their minds, he said recently.

One reader — James Simmering of Stetler Manufacturing — proposed the associate membership as a way to defray the expense of Codasyl. The idea "appears to be a good one" and is now being considered by the Planning Committee, McKinzie said.

Nearly half the second issue of the

CODASYL ANNUAL N

The fourth annual CODASYL "e" Pennsylvania on May 23, 1973. Joint Computer Conference, its committees and Task Groups (see

The Planning Committee (see

The change in type size from page 1 (left) to page 3 (right) of the Codasyl Newsletter has caused some reader complaints, and the small type will probably not be used again. On the data definition language now being considered by a special committee.

The news section of the current issue tends to be reprints of secretarial notes. The "lead story," for example, is a recap of Codasyl's 1972 annual meeting held just after SJCC, and reviews what had been done in 1971.

The issue attempts to spotlight the Planning Committee and much of the space contains useful information. Member organizations are listed along with their representatives, and the "rep's" company affiliation. This list can and "hopefully will be extended," McKinzie said, since there is no limit to the size of this committee.

In a note, the availability of ANSI's Cobol Information Bulletin #16 is reported, but nothing is said of the completion of the proposed Cobol revised standard, except that it is listed, without comment, in the table of contents. Changes related to Cobol 74, that have been published in the past three months.

Users can get copies of the newsletter or address comments to Codasyl through P.O. Box 124, 15146.

Programs Written by Geologists Can Support Other Applications

NEW YORK — Readers of the software Computer Programs for Geology, published by Artronics Information Systems Inc., can receive a good background in the use of interactive time-sharing, as well as the source code of some 20 Fortran programs — all for \$7.95.

The programs were developed for work in geology and mineralogy, as support in the user's work for another Artronics book, Statistical Analysis of Geological Data.

But at least some of them have uses beyond their original purpose.

The programs have been implemented on GE 635 systems and the source code for them is being made available to that machine. But the concepts are universal and the changes needed to install the programs elsewhere appear minor.

The first program listed provides basic statistics required for most data analyses. It includes a normal distribution, an empirical frequency distribution, mean, variance, standard deviation and coefficient of variation. Other routines in this same program identify confidence limits for a population variance and maximum and minimum values.

The program accepts any number of observations and five or fewer data points. As with many of the programs listed, the book provides "typical" input data and an illustration of what the output should look like based on that input. The authors point to the value of this for their chosen field but various business DP operations can also use random numbers.

T/S Net Adds to Edit Facilities

BETHESDA, Md. — Three complementary editing capabilities have been added to the GE remote-computing network to give business users a choice of techniques in formulating both input and output files.

The Edit service is described as a tool for broad-based data adjustments, while Tedit is designed for changes in specific files or fields. Runoff is used to control the format of printouts, the company added.

Single Program

Users requiring extensive changes or rearrangements in programs, data files or texts would utilize the facilities of Edit. It can be used to bring elements of several files together and to rearrange them by ranging the sequence of paragraphs or blocks of coding. Individual instructions cannot be altered with this service, GE noted.

When modifications in specific data

fields are needed, Tedit is used. While this capability makes the new service sound very much like file maintenance, the fact that only one command need be issued is given as a benefit. Tedit also has the ability to center lines of print, control vertical forms spacing according to the user's specifications. This service also helps to present data in readable form without heavy programming, by right-justifying fields and by adjusting spacing between columns within the body of the report.

Since the net provides access to a common data base for each user, the Edit and Tedit facilities appear to allow programs to be developed jointly by workers even though not physically located in the same city together.

SYSTEM III IS A FRONT END FOR YOUR IBM COMPUTER

System III by Value Computing is an automated job scheduling system that translates your manual priorities into workable schedules for your operations personnel.

System III gives your operators specific detailed guidance in terms of partitions and priorities and when to run them when. It increases operator performance, giving them hour-to-hour and minute-to-minute goals.

System III's feedback loop tells you what has been done and what is left to do. Daily Shift Reports and analysis of "schedules" tighten your control and increase your throughput.

With System III you get substantial increases in performance without making software, program or

JCL changes. You simply use a computer to schedule your operations and run the job automatically. System III has been implemented on 360 and 370 systems for three years in many major United States corporations, DOS, MFT and MVT systems. One client recent with a 370/155 MVT system started with 500 partitions and has grown through 8 to a six month period to System III.

System III features:

- uses SMF and JMS to build a job data base
- uses multiple partitions
- loads multiple machines
- predicts the best classes and partitions for each schedule
- allows re-scheduling in about 5 minutes
- a real world simulator for planning selection

Value Computing Inc.
496 King Highway North
Cherry Hill, New Jersey 08034

System III could be the best return-on-investment decision for your company.

Value Computing Inc.
496 King Highway North
Cherry Hill, New Jersey 08034

Send information about computer scheduling and control system
Call for an appointment

Name _____
Title _____
Company _____
Address _____ ZIP _____
Telephone _____



envelopes and business forms go together naturally...



Of all national suppliers, only **Curtis 1000** offers you both **business forms** and a full line of **envelopes**.

Your local **Curtis One Thousand** is a **business forms specialist** and an **envelope specialist**. So he can be **twice as valuable** when he calls!

He offers standard and custom business forms and envelopes. Also uniquely special business forms and envelopes and combinations — time and money savers available only from **Curtis 1000**!

Ask your **Curtis One Thousand** for complete information, including (We support 1000 customers from coast to coast, from the Atlantic to the Pacific, from the Midwest to the West.)

Vice President, Sales and Marketing, Dept. CPO 1000, The Curtis Company, 1000 South Main Street, Salt Lake City, Utah 84101.

...but only
Curtis 1000
offers you both

Interest Reports Merged; Forms, Print Time Saved

COLUMBIA, Md. — Production of year-end federal interest reports has been simplified for 360-based bank DP centers handling savings accounting applications with the combined Interest Reporting System (IRS) software from the Data Division of Hittman Corp., Columbia.

The system is said to meet the latest reporting requirements of the Internal Revenue Service while eliminating redundant paperwork. It reports all related accounts on a single pass of the 1087 forms and provides enough detail about each account so the customer can separate the data for his own tax-reporting purposes, the company said.

The system extracts interest and account information from a wide variety of user record formats, without requiring any sort of conversion run.

The data is brought together on a single new file used directly to produce the multi-account 1099 or 1087 forms, but which is also then available as an in-

quiry or reporting data base in its own right.

Tapes Generated

In addition to reducing the number of individual forms to be prepared, the system also generates tapes to Internal Revenue Service and state tax agency standards, and provides the bank itself with interest reports by branch and by type of account.

Said from reading the entire process from reading the input tape to generating the output files to printing of the 1099 and 1087 forms in a single pass, the software is currently operational in an OS/360 environment, in an 80K to 120K partition.

Written largely in Cobol, it is being adapted to DOS/340, where it is expected to function in 64K, and to Burroughs B3500 configurations.

The package sells for \$7,500 including source code and installation support, and can be ordered from Data at 9190 Red Branch Road, 21045.

Accounts Run in T/S Mode

CHICAGO — Midwestern firms anticipating a need for DP capabilities, but fearing the cost of 16-hour installations, can get four primary accounting functions handled through the Remote Computing/Billing, Accounts Receivable, Sales Analysis and Inventory Control (RC/Basic) service of ISC/Pryor Computer Corp.

In the billing operation, RC/Basic edits input data and computes all pricing, including extensions of unit prices and the application of various discounts, and sales taxes as appropriate.

The accounts receivable module maintains accounts that show a balance forward, current month's detailed activity, payments received, service charges and balance due.

The statements indicate aged amounts past due, through 30-,

60- and 90-days. The same data is summarized by account on a report for the user.

The sales analysis is particularly useful to distributors, ISC/Pryor said, since it can show monthly sales by manufacturer and location. Sales lost reports and 12-month sales histories by item and location are also generated by the system.

The inventory control system shows monthly inventory so decisions can be made based on current information.

There is a "fitting charge" to adapt the standard RC/Basic programs to a user's needs, and this one-time cost may vary from \$500 to \$3,000. Beyond that, the user is charged only for the time he uses the system.

ISC/Pryor Computer is at 400 N. Michigan Ave., 60611.

No Empty Promises

Just Bare Facts!

Our TELECOMMUNICATION MONITOR "BOSS"

can satisfy your on-line needs better, because it provides

- MORE FEATURES
- SENSIBLE PRICE
- QUALITY
- GREATER VERSATILITY
- IMPLEMENTATION EASE
- SIMPLE APPLICATION INTERFACING
- EXPANSION CAPABILITY

AUTOMATED FINANCIAL SYSTEMS, INC.
ONE DECKER SQUARE
BALA CYNWYD, PA. 19004
(215) 667-1000

COMMUNICATIONS

Data Briefs

Terminal Interface Samples Up to 128 Analog Inputs

IRVINE, Calif. — The SRC Division of Moxon Inc. has an Astroterder data terminal interface to convert analog information into RS 232-compatible serial ASCII code.

The interface can sample outputs from up to 128 channels of analog data and generate a digital output compatible with mag tape systems, TTYs, CRTs and data sets, the company said.

The system includes up to five plug-in circuit cards. Remote control and time code insertion features are optional. The basic system costs \$1,000 and operates at switch-selectable speeds of 110, 115, or 300/bt sec, costs \$770. Moxon is at 2222 Michelson Drive, 92664.

Plotter Handles Terminals

LAYFETTE, Calif. — Zeta Research Corp. has introduced a remote digital plotter that can operate at 810 step/sec. The System 3630 plotter interfaces with remote terminals operating at 10, 14.8, 15 and 30 char./sec, and at 34 in. per second, which is equivalent to continuous roll-fed plotting paper. Total plotting area equals 34 in. by 120 ft, the company said.

The 3630 is supported by compatible software for major time-sharing services and CPUs and it includes EIA RS 232-compatible interface software. The 3630 costs start at \$17,500. Zeta is at 1034 Stuart St., 94549.

NCR Adds Tape Unit

DAYTON, Ohio — NCR has introduced a paper tape transmitting unit which contains a built-in modem. Designed to handle any 5- to 8-bit data code, the 760-200 can transmit at 72 char./sec over dial-up lines.

The paper tape transmitter costs \$1,675 or \$70/mo. An associated paper tape reader with an increased paper capacity of 1,500 ft sells for \$165 or \$28/mo, the company said.

CPI Builds Texas Net

DALLAS — Communications Properties Inc. will soon begin construction of a 75-mile microwave system connecting seven cities in Texas.

Designed to handle data communications and other types of transmissions, the system will connect Dallas, Fort Worth, connecting Dallas, Austin, San Antonio, Corpus Christi, Houston, and Beaumont. The company is one of the specialized common carriers which will provide selected services to data and other users.

Now...get both in one... a batch terminal and a time sharing terminal.

Our Sycon Model 340 can perform both functions...easily and economically! This represents another first in data communications terminals from Sycon!

No longer is it necessary for the batch terminal user who has a need for a local time sharing system to maintain a simple, low-speed terminal just for this purpose in the same office. Sycon now has eliminated this expense by adding low-speed (100-baud) batch communications capability to its Model 340. A Sycon 340 user can access any major time sharing system, input the problem,

receive the solution, and then continue with the data entry operation.

In addition to this unique dual communications capability, Sycon provides users with a choice of a printer or tape magazine developed especially for data entry applications. A wide choice of peripherals is also available—printers ranging in speed from 30 cps to 200 lpm, 7 or 9 track magnetic tape drives, and a 250-cpu system.

To get started getting both in one, call or write today for our colorful, informative brochure on the versatile Model 340.

The Sycon 340 Intelligent Communications Terminal.

Channels Next Year?

Canadian Satellite Could Serve U.S.

By Ronald A. Frank
On the CW Staff

OTTAWA, Ontario, Canada — U.S. communications users might be using domestic satellite channels by the middle of 1973, if current Canadian plans materialize.

Canada's first domestic satellite, Anik 1, will successfully be launched on Nov. 9, and will begin service to Canadian users in January. The Anik 1 orbit also covers the northern two-thirds of the U.S. and could provide service to U.S. users.

The Canadian satellite, which launched from Cape Kennedy by the National Aeronautics and Space Administration, is controlled by Telesat which is jointly owned

by the Canadian Government and the country's common carriers.

At present the company is chartered to provide services only within Canada. But the necessary "revised letters patent" has been filed with Parliament, which if ratified will allow non-Canadian use of Telesat facilities.

If Telesat gets Canadian Government approval, by the spring of 1973, as expected by Canadian sources, additional authorization would have to be given by the Federal Communications Commission. Domestic U.S. service using Anik 1 would depend on the construction of U.S. Earth stations.

Domestic satellite system applications, presently pending before the FCC, include ground stations which could be built and used temporarily until a domestic satellite is launched and in service, according to a U.S. Government source.

One satellite system application is the construction of ground stations to be built in three to six months at a cost of \$100,000 to \$250,000 each. The Anik "beam" probably could serve U.S. customers from the Canadian border southward to a line running roughly from San Francisco to just north of Washington, D.C.

Pending a change in Telesat's authority by Canada's Parliament, it is not known exactly how U.S. users would access Anik 1 channels. But officials in both countries seem to favor bringing the satellite channels to U.S. common carriers who in turn would supply users to their customers.

Rates and capacities of Earth stations on Anik 1 would have to be worked out between Telesat and the U.S. common carriers.

The satellite channels would probably serve data as well as other users, according to one FCC source. But exact allocation of available satellite facilities would probably be determined by the U.S. common carriers, he said.

Digital Met in 1973

If all-digital facilities were provided between user's sites and the satellite ground stations, data users could have a digital network operating by the end of the year, according to one FCC source. But satellite facilities have not yet commented on the use of Canadian satellite channels.

With FCC approval, the first U.S. satellite system could be in operation by January 1975, the source said.

Both Canadian and Canadian authorities noted U.S. use of the Anik 1 facilities will be strictly an interim step to provide U.S. channels until a domestic satellite is available.

Letters approving the satellite usage in principle have been exchanged between the State Department and the Canadian Government, a U.S. source said.

AT&T Files 208 Rate

WASHINGTON, D.C. — AT&T has filed an interstate tariff for its 208 data set which operates at 4,800 bps/sec. The proposed charges would cost users \$125/mo with an installation fee of \$150. The tariff, if approved by the FCC, would take effect Dec. 24.

The proposed monthly rate for the 208 is \$14 more than the highest intrastate rate now being charged by Bell operating companies.

Usually Bell interstate rates are lower than intrastate charges, one source said. Seven states have already set rates for the 208, according to an AT&T spokesman, with the highest charges applied to Illinois users. In that state the modem costs \$110/mo with an installation fee of \$150, the spokesman said.

In South Carolina, Iowa, Minnesota and Wisconsin local phone companies have set \$100 for the monthly rate and a \$100 installation charge. In Michigan the monthly charge is \$105 while installation is only \$25, the AT&T spokesman said. In California the rate is \$100/mo with an installation charge of \$150, AT&T said.



Si
SYCON INC.
10000 North Drive
Ann Arbor,
Michigan 48104
(313) 971-0904

**GENERAL
AUTOMATION
SAYS
BUY DEC**

If you're shopping the minicomputer market for raw hardware at rock bottom cost, it's hard to know where to stop. With more than two dozen price lists to choose from, it can get confusing. And time consuming.

We're here to make it easy for you.

Buy DEC.

When you cut through all the claims, DEC's priced as low as anyone else. And they have built a business fulfilling the needs of the low-end iron buyer.

We make low cost hardware too. And if you're price shopping, you'll find us competitive. But raw iron is not our primary business.

The cheapest machine vs. the cheapest solution:

Sure, our goal is to save you money too. But our long suit is squeezing these savings out of your total systems cost rather than off of our price list. So if you need more from the machine or the company that sells it to you, we recommend us. General Automation.

Take *the world's most powerful minicomputer*, for instance.

The General Automation SPC-16.

The SPC-16 possesses the most powerful instruction set you can buy in a minicomputer today. Think about that. The *most powerful*. As a result, the SPC-16 does more things in less time. It will actually reduce the total cost of your system.

Depending on your specific needs, you can choose from six different models in the SPC-16 family. Each backed by the best software and peripheral capability in the business. There's another very important reason why you should buy from us.

It's called involvement.

All the other big mini manufacturers

today are touting the fact that they're "end-user oriented" or that they're now "in the systems business."

We've been doing exactly that for more than five years now. And it's nice to see that others have begun to recognize our leadership.

We learned a long time ago that the only way to really help our customers in solving their systems problems was to fully understand those problems.

So we got involved with our customers. Both end-users and OEMs. Listened attentively. Learned a lot. Got answers. And wound up building systems to solve some very tough, very complex problems.

Emissions analysis and electrical test systems for the nation's largest automobile manufacturers.

Production machine control systems for some of the biggest companies in the machine tool business.

Telecommunications and message switching systems for the world's leading communications companies, to name just a few.

In short, we've built our company and our reputation by offering answers, not just iron.

Who's it gonna be?

Actually, we've made your choice fairly simple.

If all you need is raw minicomputer hardware at a "rock bottom" price, we recommend DEC.

If you'd like something more—from a mini with more oomph to the total solution of a complex systems problem—we recommend us.

General Automation.

Our phone number is (714) 778-4800.

Or write:

1055 South East St., Anaheim, Calif. 92805

General Automation

New! **1401 SIMULATOR**
SIM 1401

NOW AVAILABLE FOR 360-50-65
USERS

- EXECUTES UNDER BOTH DOS & OS
- SUPPORTS 1401 UNIT RECORD, TAPE AND DISC DEVICES
- ICL AND FILE COMPATIBLE WITH CS340
- SELF-RELOCATING FOR MULTIPLE PARTITION EXECUTION
- THRUPUT SPEEDS EQUAL TO CS40
- PROVIDED PRODUCT BY CUSTOMER USE
- TAKE ADVANTAGE OF 95% LESS LEASE PRICES WITHOUT HAVING TO REPROGRAM ANY 1401 PROGRAMS

DEARBORN COMPUTER LEASING CORPORATION
Subsidiary of Dearborn Storm Corporation
2449 N. ALBRT SCHILLER PARK, ILLINOIS 60111
312-671-4316

Data Users Spend 50% on Lines

NEW YORK — The average data communications user spends 50% of his budget on lines, 35% on hardware and 15% on his staff and overhead, according to a study by the Diebold Group Inc.

Data communications will become more integrated into the total business area and the DP executive was asked to consider voice, data and message planning, the report said. At present, data communications represents about 8% of the DP budget for average users, the report said.

The Diebold Research Program study of more than 200 of the largest U.S. corporations showed

that firms are expanding their DP technologies to physically remote portions of the company's operations. While use of data communications has been used primarily to transmit information to top management, it is also becoming more "interactive" to increase worker productivity.

Data communications growth will expand, rather than explode within the next three years for most users, the report predicted.

Since data communications networks support business activity, management must be involved in the communications decision-making process, the

study noted.

Many users find implementation difficult of a communications system regulatory considerations, users have trouble designing their systems and selecting their suppliers, the study added.

Using standard terminals according to their functions, the report advised, adding that users should not alter their system objectives to suit particular equipment. Independent suppliers of terminals, multiplexers, concentrators and similar equipment can provide "superior cost-effectiveness compared to mainframe vendors' products.

In configuring a network, users should also utilize "automated analytical tools" to evaluate alternatives and optimize their networks, Diebold said at 430 Park Ave., 10022.

2750 PBX Unit Installed

MECHANICSBURG, Pa. — IBM has installed its 2750 computerized PBX system at the Pennsylvania Manufacturing center here. The system is available only through World Trade, outside of the U.S. The 2750 "was installed as part of the evaluation of the product" and it is not unusual for IBM to take advantage of products available within the corporation, an IBM spokesman said.

Setting Standards

Vermont Research

in Memories

The Standard

1000 Series

Over 2000 delivered since introduction in 1968

The standard for head per track memories as set by Vermont Research 1100 bits per inch 8.7ms average access 2 megacycle data rate and a range of products to choose from

The New Standard

3000 Series

Newest electronics
Newest magnetics
Newest mechanics
The best in performance and reliability. The new standard for head per track memories is again set by Vermont Research. 2200 bits per inch 8.7ms average access 4 megacycle data rate and a range of products to choose from

5000 Series

A moving head memory with a conservative Vermont Research specification
Surely the standard of moving head devices.
400 tracks per inch
4000 bits per inch
35ms average access
6 megacycle data rate
40 megabyte capacity and a range of products to choose from

Whether it is disc or drum — whether it is head per track or moving head — whether it is digital interface or complete memory system, you should call us at Vermont Research to review your requirements for rotating memories

Vermont Research Corporation
Precision Park
North Springfield
Vermont 05150
Telephone: 802-866-2256
Telex: 710-363-5533

VRC Inc.
5261 West Imperial Hwy
Los Angeles
California 90045
Telephone: 213-641-7100

Vermont Research Limited
Cleve Road
Leatherhead
Surrey
Tel: Leatherhead 74758
Telex: 23280

**for sale
or
lease**

All 360 Systems and I/O Equipment at savings of
**50%
TO
70%**

We will purchase any 360 equipment available for immediate or future delivery.
Please contact: **Bernard Gent**

**COMPUTER
MARKETING
INC.**

7704 Seminole Ave.
Metrow Park, Pa. 15126
Call (215) 635-6112

**System/370 Operating Leases
3-5 Years
Substantial Savings
FREE "Computer Marketing" Bulletin**



"Me, too," they're not.

Go MDS instead of IBM 3410/11, and you're in for more than 10% dollar savings.

Which announces our 8410/11 tape.

You'll get higher drive speed for greater throughput, model for model, across the board. Your choice from MDS is 25, 50 and 75 ips, instead of 12½, 25 or 50 ips.

What's more, you get eight-drive capacity per subsystem instead of six. Plus automatic thread instead of manual. Plus cartridge option instead of no option. Plus 33 to 50% faster rewind times. Plus compatible with both 360 and 370, of course.

Meanwhile, if you need performance in a higher or lower range, we've got that too. And disk systems. And printers.

We also have the service that helped make us the peripheral power. Today, we have over 2,000 men in the field, who have earned us the second largest customer list in the industry.

Questions? Good. Call our nearest sales office or call headquarters at (315) 792-2038. Mohawk Data Sciences Corp., World Headquarters, Utica, N.Y. 13503.

The Peripheral Power

MDS

GE's new Mark III can cut your time-sharing costs by a third

What we're offering is not a miracle, but a new approach to information processing: Mark III. It's a single, unified service that combines the response of interactive time-sharing, the economy of remote batch processing, and the reach of a worldwide communications network.

Your total savings depend on your own applications, but our estimate of one-third may be conservative. For example, with Mark III you can save one-half or more of your processing costs just by moving your time-sharing programs into remote batch operation. In addition, Mark III includes new time-sharing capabilities that can lower your costs dramatically. To tie it all together, a new budget allocation and control system helps you get the most out of each computing dollar.

General Electric introduced the first time-sharing service in 1965. In 1970, GE established the first

international information processing network linking over 250 locations in North America and Europe.

And now Mark III—an integrated network of nearly 100 interconnected computers. With a network this size, each computer performs that task for which it's best suited—communications, interactive time-sharing, or batch processing. The result is a service that can tackle your computing needs easily, reliably ... and, most important, economically.

If you're a Mark II user, Mark III offers major new features and is fully compatible. If you're not, it's time to make a serious comparison of Mark III with whatever information service you now use. Phone 800-638-0971 or write us at 7735 Old Georgetown Rd., Bethesda, Md., 20014. We're ready to help.

291-63A

GENERAL  ELECTRIC

WORLD LEADER
IN INFORMATION
SERVICES

SYSTEMS & PERIPHERALS

Bits & Pieces

\$1,995 Matrix Printer Operates at 100 Char./Sec

HUDSON, N.H. — An 80 char./sec matrix impact printer, operating at 100 char./sec and 60 full lines/min is available from Datronics Data Computer Corp. for \$1,995.

The Model 306 uses a 5 by 7 dot matrix and can produce up to four carbon copies, the firm said.

Variable font sets are available and can be expanded up to 128 characters as an option. This feature allows output to be printed in up to 17 different languages, the firm said.

User applications include hard copy output, time-sharing use and communications applications. Delivery is 30 days from One Wall St., 03051.

Source Record Punch Performs Simultaneous Operations

DAYTON, Ohio — The Model 1740 Source Record Punch (SRP) can be programmed to receive and route information at the same time it is preparing printed or punched output, according to Standard Register Co.

The Model 1740 can accept information from various sources including its keyboard and internal disk switches.

The units are priced at \$4,150, or \$175 on a monthly rental basis with an option to buy from the firm at 626 Albany St., 45468.

Industrial Control Mini Offered

PRINCETON, N.J. — A \$30,000 mini-computer and software system designed for industrial control operations is available from Metromation, Inc.

The Basic Control System (BCS) hardware includes a CPU with core memory, program I/O, teletypewriter and console. The system is available in either core only or core-disk configuration, the firm stated.

A system with 16K words of core storage and 1.2K word disk storage for program and 16K word disk storage with 16K word capacity sells for around \$30,000.

In operation, the BCS controls real-time input devices using a multiprogramming monitor and a Basic language interpreter. The firm is at 1101 State Road, 08540.

Add-Ons Available to Sigma Users

VAN NUYS, Calif. — Sigma 5 and 7 users can benefit add-on semiconductor memory modules from Sigma Galaxies Inc.

The Model SG-5/7 is fully hardware and software compatible and cables directly to the Sigma memory bus, the firm stated.

Operating cycle time is said to be 650 nsec, depending on mode of operation.

Field expansion is possible through plug-in memory cards in 4K increments up to 16K, and all units come with an off-line simulator test system. Each memory bank may be expanded with up to 16 ports.

The basic 4K system costs \$16,000 and a full 16K memory bank sells for \$25,000. All units carry a one-year warranty from 6955 Hawthorne Ave., 91406.

Debug Unit Made for PDP/8 Users

PISCATAWAY, N.J. — PDP/8/E users can debug programs by halting execution at selected memory locations with the CIS 110A Hardware Breakpoint Module from Computer Interface Systems Inc.

The unit consists of a switch panel assembly, cable-connected to a printed circuit board which plugs directly into any Omnimain slot.

The \$485 module is available through Box 58, 08854.

Users Can Write Their Own Microprograms

LONDON, England — Recent advances in microprogramming techniques allow the user of a Hewlett-Packard 2100 minicomputer — or any similarly designed machine — to tailor new programs to the CPU, according to John Page, senior systems engineer for Hewlett-Packard.

In operation, this means the user can extend a minicomputer's instruction set to include commands specifically designed for the machine — that are programmed beyond the machine's limit, he stated.

Microprogrammed computers — such as the 2100 — differ from conventional hardware machines in that the CPU references a "control memory" which contains read-only control instructions. The 2100 contains only 256 words of read-only control memory (ROM) for the entire instruction set, Page stated.

Page explained the procedure for creating microprograms on the HP 2100:

• Record the coded program on some input media.

• Process the tape on the unit by using a microassembler that comes with the computer. This process is analogous to a normal machine code assembly, in that a machine intelligible program is produced from a human-oriented symbolic origin.

• Feed the finished microprogram into the ROM control store using the software supplied with the computer.

• Program execution is performed in the same manner as before, except that when the machine executes one of the new instructions it will reference the user-created microprogramming in the control store.

To provide space for users to enter their own microcodes, a Writable Control Store (WCS) memory is provided that functionally sets the same as the ROM but can be written upon or changed by the user.

Report Urges:

Study Units, Internal Needs, Then Buy

By Michael Weinstein

Of the CW Staff

MOORESTOWN, N.J. — IBM's recent announcement of a "low-cost" Optical Character Recognition (OCR) system (CW, Nov. 13) may not mean most users will consider this a valid technique to speed up data entry.

But before they rush out and buy them should do their homework on the types of units available and perform an internal study of the format of their data, according to a Datapro Research special report.

There are basically three types of OCR

All About OCR

units available: mark-sense readers, barcode readers and character readers, the report stated.

Mark-sense units are the simplest. They interpret rows of hand written marks using the same non-conditional logic as the reader in punched cards. The mark sense technique is usually limited to inputting numeric data, however, since the preparation of alphabetic input would require the person marking the card to use the Hollerith code. Applications for mark-sense units have traditionally been test scoring, questionnaire reports, input from readers, etc.

Barcode readers can read both numeric and alphabetic information. One difficulty in using these units, however, is that information to be read by the unit is printed in a form that is hard for a person

to read and almost impossible to duplicate by hand, the report noted.

An example of a specialized font used for barcode units is the code used on personal checks to identify the account number.

The character recognition units that read standard letters and numbers are the most elite and the most expensive of the OCR devices.

Most character recognition devices read from printed type fonts — the most common are OCR-A and OCR-B. Selective typewriters with interchangeable fonts can be used for input preparation.

The greatest drawback of character recognition units, according to Datapro, is the cost and the physical size of the system. The user must get carried away with a machine that has all sorts of neat features that they don't really need.

To determine what type of OCR unit to buy, users are advised to break input into three areas: data input to application programs, programming input to application programs. By first understanding the form of the input, the user can easily avoid units that he does not need, the report continued.

Applications data represents the largest volume of input. In the typical form, it is usually in the form of a large number of records, each in a simple and repeatable format.

Various manufacturers estimate that any installation having from seven to 12 keypunches can profitably make use of OCR equipment, the report said.

Programming input is more complex

and is characterized by low volume and the need to conform to a set language for form.

Correction capabilities depend on the form of the original input but generally are more complex. The unreadable character must be displayed but this character must also be shown in context to surrounding information.

The full report — "All About Optical Reading" — describes the various applications, device specifications, output media, error control features, performance, pricing, availability and applications of 74 OCR readers with price tags from \$1,235 to \$1 million.

Copies are available for \$10 from One Corporate Center, Route 38, 08000.

IM-Byte Add-On Replaces IBM 360

Mainframe Memory

MARINA DEL REY, Calif. — A 16M byte replacement memory for IBM 360/65, 67 and 75 users who want to enlarge mainframe memory is available from Amplex Corp.

The Amplex Mainframe-ECM memory is divided into two sections: 16M bytes of core memory and 32K bytes semiconductor cache memory.

Cycle time for the cache portion is 250 nsec which when operating with the core memory portion provides an overall cycle time of 750 nsec. The overall speed rating of that of the IBM 2365 mainframe memory replaces without software modification, an Amplex spokesman stated.

"A memory's overall cycle time is determined by a successful data access rate, called 'hit ratio.' The Amplex cache is expected to have an average hit ratio of at least 90% due to the large size of our cache. IBM uses an 8K byte cache for its 370/155 system and has experienced a hit ratio of 80%," Amplex claimed.

The 16M byte Amplex add-on leases for \$8,000/mo on a two-year lease including 16M bytes of memory and 32K bytes of cache. Comparable mainframe memories from IBM and other suppliers lease for \$12,000 to \$36,000/mo and sell for \$50,000 to \$1.5 million, Amplex said.

Precise users of Amplex ECMs can add the cache memory feature through modification of their existing memories.

Amplex is located at 13031 W. Jefferson Blvd., 90219.

Display Aids Tape Operators

MOHAWK, N.Y. — The VSN-1 volume serial number display is mounted over remote tape drives to visually display mount messages to the operator.

The alphanumeric display unit from Advanced Electronics Inc. has a flat surface with the drive itself, electrical power and signals come from the central controller which interfaces with one or more CPUs, the firm stated.

When a tape is to be mounted, the host CPU transmits tape identification information to the unit. This information is displayed to call the operator's attention to the waiting drive.

The unit is available for either a multiplex subchannel or a communications channel interface to the CPU. The controller operates on standard 110V 60Hz lines, ADS said.

Monthly rental for a typical 12 tape drive display system including controller and communications interface is \$19, display from 146 W. Main St., 13407.



VSN-1 Display Unit

**VOLUME
KEY PUNCHING**
(402) 546-0330

**AMERICAN
KEY PUNCHING**
Redick Tower
Omaha, Nebraska 68102

COMPUTER FINDING

has found a new home.

WE'VE MOVED!

For the best in 360/370 leasing,
contact us at our new location:
Computer Finding Corporation
201 East 66th St.
New York 10021
(212) TR9-5210

COMPUTERWORLD

Burroughs Unveils 4 Data Entry Units

DETROIT — Burroughs has a new series of data recording and sorting equipment directed at users operating 96-column punched card data entry systems.

Of the four models in the PC 900 series, three are data recorders and one is an alphanumeric sorter.

The PC 910 data recorder punches and verifies up to 60 card/min and has a primary input hopper with a capacity of 600 cards and a secondary hopper for 400 cards. Two output hoppers include one each holding 400 cards, the firm stated.

The PC 920 has all the features of the 910 end can also print at 60 card/min and has a card puncher. This capability is unique, the firm claimed, in 96-column card off-line equipment because no interaction with a computer system is required.

The PC 930 includes the data-recording features of the two smaller units with a sorting two-unit option.

The unit can sort cards with numeric or alphanumeric data at 300 card/min into six output stacks — each with a capacity of 400 cards.

Computer specifications state normal operating times are an average of 1-1/2 passes per card column for numeric data and 2-1/2 passes per card column for alphanumeric data.

The PC 990 alphanumeric sorter group and sequence 96-column cards at 1,500 card/min. Normal operating times are 1-1/2 passes per card column for numeric data is sorted in a single pass and alphanumeric data at 1-1/3 passes. The unit's input hopper

can hold 2,000 cards, and 11 output stacks accommodate 1,200 cards each, the firm stated.

Per-unit prices of the PC 910, \$6,950 to \$12,530 with comparable monthly leases running from \$140 to \$190.



PC 910 Data Recorder

MOVING?

Please notify Computerworld at least four weeks in advance. Include both old and new addresses. When writing Computerworld, please enclose a recent mailing label. The code line on top may not mean much to you, but it is the only way we have of quickly identifying your records. If you are receiving duplicate copies, please send both labels.

COMPUTERWORLD, 797 Washington St., Newton, Mass. 02160

Extend a little, replace a lot,

**360 users
get any size
they want
with Fabri-Tek 360 core.**



To date, Fabri-Tek has over 150 installations of 360 extension memories. And, IBM has agreed to maintain all these CPUs which have been modified by the addition of Fabri-Tek extension core memory. For further information, call (612) 935-8811 or write FABRI-TEK INC., 5901 South County Road 18, Minneapolis, Minnesota 55438, leader in Memory Technology For Over A Decade.

FABRI-TEK
360 CORE YOU CAN TRUST

FABRI-TEK SALES OFFICES

New England
1250 Main Street, Woburn, Mass.
(617) 968-5977

Eastern
1250 Main Street, Woburn, Mass.
(617) 968-1215
Blue Bell, Pa.
(215) 269-1000
New York (Poughkeepsie, N.Y.)
(212) 362-2200
Portland, Maine
(207) 785-1995

Midwest
1250 Main Street, Woburn, Mass.
(617) 968-5977
Chicago, Ill.
(312) 432-1114
Cincinnati, Ohio
(513) 223-7888

Midwest
1250 Main Street, Woburn, Mass.
(617) 968-5977
Milwaukee, Wis.
(414) 843-5640
St. Louis, Mo.
(314) 961-8571
Dallas
Dallas, Tex.
(512) 961-2423
Houston, Tex.
(713) 656-7900
Austin, Tex.
(512) 442-0872
Columbus, Ohio
(614) 223-0872

Western
Phoenix, Ariz.
(602) 944-4448
San Francisco (Sausalito), Calif.
(415) 758-4166
Los Angeles (Long Beach), Calif.
(310) 425-2442
Seattle, Wash.
(206) 522-2413
Portland, Ore.
(503) 223-2200
San Jose, Calif.
(415) 223-2200

Quantor
COMMON SENSE
in
Grocery Chains



A large grocery chain
shelved a competitor system
for Quantor COM.

Quantor

520 Locus Avenue, Mountain View, California 94040 (415) 965-3700.
Cleve Brook (Chicago) (312) 554-3720, New York, N.Y. (212) 279-3280;
Washington, D.C. (202) 960-3707; Los Angeles, Calif. (714) 833-0157;
Miami, Fla. (305) 448-3650; Atlanta, Ga. (404) 237-1176;
Houston, Tex. (713) 772-1772



How Denver General Hospital took the emergency out of its replenishing procedures.

Denver General is a 350-bed hospital in Colorado's capital city.

Like most hospitals, it struggled with a 150-day inventory load that still couldn't eliminate expensive rush ordering.

Its accounting system could only account for about 75% of all items moving out of inventory. Which meant that somewhere along the line, 25% of proper patient charges weren't being made.

This year, Denver General installed SYSTEM TEN® computer by Singer.

Now, Denver General bills from its accounting process 100% of all inventory used.

The hospital is now working with a 30-day inventory, with virtually no rush-ordering.

Every ward and every service orders supplies through SYSTEM TEN. Files are constantly updated. The system prints out on a regular basis: balance on hand, current usage, year-to-date usage, year-to-date receipts, and

current receipts. A stock status report is printed monthly, but could be done daily if needed.

Once a week, purchase orders are generated from the system, with the ability to override orders in order to increase them, decrease them, or not order at all.

Soon, another SYSTEM TEN will take over the hospital's total accounting system, following patients from admission to discharge, tracking charges, preparing bills—even preparing the General Ledger. Together, the two systems will give Denver General an automated cost accounting system.

We can supply you with all the facts on SYSTEM TEN installations for many industries. Specific case histories that include hardware, software, configuration, sample forms, costs. Just contact your nearest Singer Business Machines representative. Or write: Singer Business Machines, San Leandro, California 94577.



A Division of The Singer Company

**System Ten by
SINGER**

HOW TO RENT A MINICOMPUTER.

1 Just try to find one. Until now, rental companies and minicomputer companies just haven't been very interested. The mini business was built on purchase orders, and it's hard to break old habits.

Rental Electronics, Inc. thinks differently. Of course, that shouldn't surprise anyone. REI is number one in U.S. electronic equipment rental; we've gotten there by specializing in original ideas.

2 Pick the right machine. If you were buying a minicomputer, you'd look for a modern machine with the best price/performance on the market. If you rent or lease, you shouldn't have to settle for anything less. That's why REI went to Data General Corporation when we decided to get into the minicomputer business. The Data General Nova 1200 computer you rent/lease from REI is one of the most modern, popular, and reliable minicomputers available.

3 Pick the right configuration. Rental Electronics offers Nova 1200 computers with up to 32K 16-bit words of core memory, along with standard central processor options and interfaces for peripherals.

4 Think about the peripherals you need. We can supply any standard Nova 1200 peripheral, completely interfaced, and ready to run.

5 Get the software you need. A Nova 1200 from Rental Electronics comes with all the software you'd get if you bought the same machine from Data General. That includes standard things like assembler, editor, loader, debuggers, ALGOL, time-share BASIC, and FORTRAN.

6 Arrange for field service. REI offers full On-Call Service contracts... you pay a monthly charge and nothing more. Most important, the computer you rent from REI is serviced by the same Data General staff that has made a reputation as one of the best in the computer business.

7 Arrange the right terms. With a 3-year lease, an 8K Nova 1200 with Teletype (purchase price approximately \$9,800) costs less than \$250 a month; with a 1-year lease, it's less than \$335 a month. The same system, on a month-to-month basis, with maintenance, costs about \$784 a month. Or, under a rental-purchase agreement, it's \$980 a month, with 80% applied to purchase after 6 months.

8 Call us. We know you can't rent a complex piece of equipment from an ad. Call the nearest Rental Electronics office for more details. Lexington, Massachusetts (Corporate Headquarters), Tel. 617/862-6905 • Gaithersburg, Maryland, Tel. 301/948-0620 • Oakland, New Jersey, Tel. 201/337-3757 • Fort Lauderdale, Florida, Tel. 305/771-3500 • Rosemont, Illinois, Tel. 312/671-2464 • Dallas, Texas, Tel. 214/638-4180 • Palo Alto, California, Tel. 415/328-4525 • Anaheim, California, Tel. 714/879-0561 • Ontario, Canada (PLC Leasing Limited), Tel. 416/677-7513. Or call any Data General office.

9 Or Write. Send your name and address to "How to Rent a Minicomputer" Rental Electronics, Inc., 101 Hartwell Avenue, Lexington, Massachusetts 02173, and we'll send you our brochure with all the details. We're serious about minicomputers.



Rental Electronics, Inc.

A PEPSICO LEASING COMPANY

101 Hartwell Avenue
Lexington, Massachusetts 02173

COMPUTER INDUSTRY



Fabricom's booth lights up the hall with its OEM and end user lines of core memory planes, stacks and systems and extension core memories for 360s.



Mohawk Data Sciences concentrated on OEM exhibits, displaying its Model 2021 Cartridge Tape Drive, along with other tape drives, printers and card and tape handling products.



CIT Photo by E. Drake Lundell Jr.
Attendees gather at PowerTec booth to view its line of AC-DC power supplies, DC regulators, inverters and switching power supplies.



Onlookers watch Decision Data's 96-column card punch in action. Decision also displayed other members of its 96-column card line, a data recorder, alphanumeric sorter, and a card reader.

'Lots of Industry Types Here'

In Quality, Quantity Joint May Be Best in 3 Years

By E. Drake Lundell Jr.

Of the CW Staff

ANAHEIM — The last Joint Computer Conference may also have the distinction of being the best in the past three years. The show's conference with 460 exhibitors in 410 booths was close to the best in terms of those figures since 1969 — when almost 1,000 booths were sold — and definitely reversed the downward trend evident in this area for the last three years.

Attendance figures also appeared better than in recent years, with exhibitors happy not only about the numbers of attendees, but also with the quality of the average show-goer.

"For the past couple of years," one exhibitor said, "we have been getting a good quality of attendee, but the numbers have been bad. But this year it looks like we are getting both — good numbers and we're seeing the type of person we want to see."

"There are lots of industry types here," another said, "and they seem to be from a higher level than in the past couple of years, and definitely higher quality than the attendees who mobbed some of the shows back in the heyday of the JCCs."

The last Fall Joint, another long-time exhibitor said, "has the look and feel of some of the shows in the middle and late 1960s, say 1967 and 1968, or a little earlier."

Court Ruling Said to Favor Patents

NEW YORK — In the recent Supreme Court Benson-Tabbot patent decision, there is no broad ruling implicit that will prevent the future grant of software patents by the Patent Office, according to Morton B. Tabbot, patent counsel for the Association of Data Processing Service Organizations.

"To the contrary, the Supreme Court decision actually draws a line between what is patentable and what is unpatentable in connection with computer software inventions," Jacobs observed.

The Patent Office originally refused to grant a patent to Benson and Tabbot on the grounds that the patent would not be limited to a machine process, but would cover a mental process as well.

The Supreme Court upheld the previous Patent Office refusal because the patent claims would cover the performance of the mathematical process "without any apparatus," which would not be patentable subject matter, he said.

"The problem," he said, "is that there were a few really flush years right after that and everybody began to expect the show to be a lot bigger than it was and to have more than 1,000 booths. So when the cutback came, everyone compared the size of the show against those very big ones and not against the smaller ones that were more typical."

That the day of the big shows might not be over, however, was indicated by the show's sponsor, the American Federation of Information Processing Societies, for the first National Computer Conference next June in New York.

Presently, Aips has space for about 750 booths, which would be a significant improvement over the past few years, and is guessing near 30,000 attendees.

This space would only occupy two floors of the mammoth coliseum; the Neponet East show has the other two floors, but is planning to use only one for its 1973 show.

Some sources noted that if the big shows are definitely back, Aips might possibly occupy the third floor of the coliseum, for a total close to the old 1,000-booth shows.

It is hard to tell now, but Aips has already booked 150 booths for the show and appears confident of selling out the 750, sources said.

Analysts are pointing to the possibility of bigger shows once again as the number and diversity of new product introductions during this year's conference.

New products ranged from keyboards and other computer input devices to video cameras and systems and there were more of these announcements than in the previous three years, several sources indicated.

Since the joints have always been considered by many firms as a forum for new product announcements, several sources indicated that the rate of new product development might once again be picking up, a point that would justify larger shows.

"I really think it is a shame that Aips dropped the two-show-a-year idea just when it appears that the entire market is coming back. They shouldn't have been scared off by the recession which was bound to end," one long-time exhibitor added.

3330-Like Disk Units Get Interfaces

ANAHEIM — OEM buyers can now get the speed and capacity of IBM 3330-type disk drives with the introduction of two units designed for the non-IBM compatible market, while taking advantage of the 3330's interface.

Amplex and the Remex unit of Ex-Cel-O Corp. both introduced devices at the JCC designed with interfaces for non-IBM equipment.

The unit gives manufacturers "more freedom" in designing disk drives into their systems, according to Eugene Prince, vice-president and general man-

ager for the Ampex Computer Products Division.

"The OEM often has had to use unnecessarily complicated IBM-type interfaces even though such compatibility was not required by the system," Prince said.

The interface, he said, is highly simplified between the disk drive and the controller and the unit is operation on a 28-msec average access time, compared with the 30-msec average access on the IBM 3330 due to the use of voice coil positioning. The start/stop time is 15 sec opposed to the IBM time of 40 sec, he

noted.

"Software is a machine process implemented in computer programs, while hardware is a machine process implemented in computer circuitry," Jacobs believes that "apparatus claims" directed to a particular machine and to a particular end use actually survived the Supreme Court ruling, as evidenced by Justice William Douglas' statement, "It is a well-known decision precludes a patent for any program servicing a computer. We do not so hold."

Apparatus claims are based on directing a machine in a unique way. Such claims, therefore, qualify as inventions which "control a process or algorithm" for a particular end use, he said. Apparatus claims are actually for the control or mechanism, rather than for the process or algorithm itself, Jacobs added.

The Remex unit does not duplicate the 3330, but uses much of the same technology to produce a 300-Mbyte memory in comparison to the 800-Mbyte IBM unit.

The Ampex DMS-330 is priced between \$16,000 and \$25,000 depending on configuration and quantity, according to Prince.

The Remex 3320 disk system is available in four field-expandable models including the 3320-1, a 75-Mbit configuration, the 3320-2 with 150 M-bit capacity, the 3320-3 with 225 Mbit bits and the 3320-4 with 300 Mbit bits.

The unit features a track density of 164 track/in., and a high-speed voice coil actuator with a built-in optical-sensing system.

The average head-positioning time is 30 msec, the firm said, and the average rotational latency of the unit is 8.3 msec with data throughput rates of 6.45M bit/sec.

Up to Four Units

Standard features include a belt-driven disk which gives identical performance at 50 or 60 Hz, and a capability of expansion by daisy-chaining up to four units, the firm said.

Several sources at the show indicated there could be a large market for these units, particularly in high-speed disk units, particularly among mini makers and in special-purpose systems.

But most of the enthusiasm was reserved for applications in the areas of terminals and data entry, where the higher capacity and speed were seen as real advantages for the 3330-like technology.

More Competition

Cassette Tape Drive Vendors Leery of Floppy Disk

By E. Drake Lundell Jr.
Of the CW Staff

ANAHEIM — Almost all cassette tape drive manufacturers showed up here at the Fall Joint Computer Conference, boasting of good sales, but with one eye on the rapidly expanding floppy disk manufacturers who are beginning to

marketing man at International Computer Products said, but admitted, "The floppy disk prices are coming down to a point now where we are going to have to offer them more and more in the marketplace."

"I think that there is a market for both the cassette drives and the disk units," another marketing man said, "but I will have to admit that in the past six months they have been giving us a lot more competition in areas we used to have for ourselves, especially in the terminal busi-

"The floppy disk prices are now getting down to the range and price level of our cassette computers," Jerry Shore of Redaction admitted, but emphasized his firm had also seen "several" good prospects during the show.

The problem, one marketing man said, is that "we are now getting squeezed from both the cartridge manufacturers which have made some inroads into what we thought would be our market, and now from the floppy disk side of the business."

"There are some companies that want to go with the latest and therefore they are looking at the floppy disk before we have really been able to penetrate any of the markets thoroughly," he added.

"We are still being hurt by the standardization battle," another admitted. "Po-



Raymond Engineering

"We are still being hurt by the standardization battle," another admitted. "Po-

"It is clear," he added, "that they could easily make the floppy disk unit the standard and users always want to stick with a product that has the IBM seal of approval."

Another agreed by noting there had been a slowdown in the cassette order rate in Europe since the IBM announcement.

"I wouldn't say there has been any real market churning, but the rate definitely slowed down and is behind our projections," he admitted, adding, "It seems to be coming back now but the old rates."

Mini Systems Age Due for a Change

ANAHEIM — General Automation, Inc. foresees a change in the emphasis accorded the minicomputer market in the 1970s as the "IBM Age" of the minicomputer industry which "was characterized by a scramble among manufacturers to see who could produce the most hardware," GA said the 1970s will be known as the "Systems Age."

"The emphasis will be on systems, rather than on minicomputers, as new technologies give rise to new applications in emerging vertical industries."

In the second stage of development which will open up new applications, new OEM and standard systems will be developed.

"The minicomputer's role will be reduced to that of a component and the industry as it is known today will belong to those companies who have the systems expertise to add the most contributed value to the minicomputer," according to the firm.

concentrate on some of the same markets.

Almost 10 firms serving the cassette market attended, mainly concentrated in one section of the hall that became something of a "cassette city." Although floppy disk makers were not as well represented, they became a major topic of conversation in the area.

Among the firms displaying cassette devices were Computer Access Systems, International Computer Products, Raymond Engineering, Redaction Corp., Remex, Kyte Corp., Sykes Datatronics, Techtron Industries and Sycor, which operates an OEM cassette unit in addition to its intelligent terminal line.

"We're seeing good prospects here," a



International Computer Products, Inc.

Remex Booth

Have we got Exhibitors for You!

A computer show is known by the companies it keeps. And we've got some of the best. These organizations—and others like them—will be in the exhibition portion of the Computer Caravan/73.

And they'll be bringing you the latest information on a wide variety of EDP products and services. So when you see the Caravan in a city near you, you'll see what you need to know to keep ahead of this fast-changing industry.

If you're a Computerworld subscriber, you'll be getting the details on the Computer Caravan/73 in the next issue of the Forum. And the Caravan Forums are a unique way to discuss your problems in a completely user-oriented atmosphere. And they're well worth your time. If you're a computer marketer, there still may be time to make sure your company is there when the Computer Caravan/73 starts its second big tour. Call Neal Wilder or Donie Travis right now for all the details—(617) 332-5606.



The Computer Caravan/73
sponsored by
COMPUTERWORLD

Boston / Washington / New York / Atlanta / Houston / Anaheim / San Francisco /
Kansas City / Chicago / Cleveland



To: Frazzi Blackler
The Computer Caravan/73, 279 Washington St., Newton, Mass. 02160

I'm a Computerworld subscriber, but I'd like to attend the Computer Caravan/73. Please put me on your mailing list for Forum enrollment materials. I understand I will receive materials sometime before the Caravan comes to a city near me.

Name _____
Title _____
Company _____
Address _____
Zip _____

Minis, Memories, Modems

Some New Faces Introduced to OEM Marketplace

By E. Drake Landell Jr.

Of the CW Staff

ANAHEIM - Several firms used the FJCC as a platform to launch new products ranging from minicomputers to tape drives and disk peripherals to output devices.

Computer Automation took the wraps off a new version of the Naked Mini with an 8-bit system that will sell for as low as \$1,450 in quantities of 200.

The "Byte Cruncher" uses 115 basic instructions and 16 levels of nested loops in the basic unit expandable to 32K. The direct memory channels (2 standard, up to 64 optional) operate at up to 90K byte/sec, the firm said.

The memory system is 1,600 msec. with add/direct access and 3.2 μ sec. and memory up to 18 meg. The unit also features three standard vectored priority interrupts with up to 256 optional, the firm said.

Data Products unveiled two new systems at the show, one in the medium speed printer area and the other an expansion of its memory line.

The new 2230 impact printer operates at speeds up to 300 line/min in a 1/2 column format and can produce up to six carbon copies.

The printer, which is said to be the first in a planned new series of medium speed printers, is expected to be useful in the small computer systems and terminal area, Data Products said.

The computer system features 64 characters standard with options for 86 and 96 characters and has a modified Ascii font. In the area of core storage the firm announced three new products: the Mini-Store; the Store/2000 which is compatible with the Electronic Modular Micromemory-2000; and the Store/1885, compatible with the Ampex 1885 memory.

The Mini-Store has a 650 msec cycle time and 270 msec access time. The basic module is 88 by 18 bits expandable to 65K by 18.

Services Industry May Grow Rapidly Over Next 7 Years

ANAHEIM - The computer service industry will grow at a rate of 18% a year for the seven-year period starting in 1971, outpacing the computer industry in general, which will enjoy a 15% growth, according to an industry executive.

David C. Jung, vice-president of Quantum Science Corp., told an FJCC audience that the facilities management (FM) sector would be the most dramatic, with sales leaping from \$645 million last year to \$3.9 billion in 1977.

Currently, 26% of all EDP expenditures is for some type of service, and this proportion will increase to 31% in 1977, Jung predicted.

He also foresees the emergence and increasing popularity of multiservice vendors because users want to deal with fewer vendors, he claimed.

Network information services (time-sharing) will enjoy a growth similar to facilities management, Jung indicated, with that sector quadrupling sales from \$430 million last year to \$1.8 billion in 1977.

Software, Jung predicted, will grow from \$467 million to \$891 million in the period, while mainframes will grow at a much slower rate, from \$630 million last year to \$750 million in 1977.

In support of the prediction that multiservice vendors would grow in number, he said these suppliers can enjoy economies in marketing and operations.

"Facilities management," he commented, "is a catalyst for multiservice vendors," since FM firms take over a complete operation, including ownership of products of many vendors.

The cycle time on the Store/1885 is 650 nsec or 750 nsec and access time is 340 nsec or 300 nsec. The basic configuration is 8K by 18 expandable to 65K by 18.

The Store/2000 has a cycle time of 1,000 nsec and access time of 400 nsec and contains a 48K by 12 bit or 16 bit core memory expandable to 32K by 18.

Caelus Memories announced a new tape drive and core memory for OEMs in addition to a special 3330-type disk drive for the OEM marketplace (see story on page 37).

The TMC-1000 tape drive has a transfer rate of 10 to 50 in./sec and carries a purchase price of \$4,000 in OEM quantities. The unit has packing densities of 16 in. in pairs; 200 and 556 bit/in., 200 and 864 bit/in., and 556 and 800 bit/in. and electronically selectable dual density of 800 bit/in. and 1,600 bit/in.

The TMC-1000 is also available in 7 or 9 track format. The model 700 operates at 12.5 in./sec, the model 800 from 12.5 to 25 in./sec, and the model 1000 from 12.5 to 50 in./sec, the firm said.

The model 9100 memory, a Caelus tape drive, the first core memory unit to offer a better cost/performance combination

than semiconductor storage in capacities of less than 4K words of 9 bits.

Using the Ampex Temperature Independent cores, the unit has an access time of about 400 nsec and is priced at less than \$1,500. The unit is offered with 1K, 2K and 4K 9-bit words and 1K and 2K 18-bit words.

Caelus Memories introduced three new tape drives: the Model 700 with a 7 in. reel, the Model 800 with a 8-1/2 in. reel, and the Model 1000 with a 10-1/2 in. reel. The tape density is said to be less than 1 bit in 10^6 . The drives feature triple density (200/556/800 bit/in.) and electronically selectable dual density of 800 bit/in. and 1,600 bit/in.

The TMC-1000 is also available in 7 or 9 track format. The model 700 operates at 12.5 in./sec, the model 800 from 12.5 to 25 in./sec, and the model 1000 from 12.5 to 50 in./sec, the firm said.

The Litton OEM Products Division pre-

sented its OEM Model 30 asynchronous serial printer which features 192 print positions, front form assembly, 30 chart/sec operation and 47 character characters (26 alphanumeric, 11 special).

American Data Systems introduced a 4,800 bit/sec MOS modem priced at under \$3,000 or as low as \$1,450 in quantities. The ADS-440/48 is a full duplex modem designed to operate over both conventional telephone and voice grade telephone lines, the firm said.

A switching option provides operation at 2,400 bit/sec and may be used to multiplex two independent 2,400 bit/sec data channels, ADS said.

The firm has also introduced a high resolution 4-color CRT monitor at the show, the first move by this high power specialist into the display arena.

The unit, which offers red, orange, yellow and green colors, is priced at \$11,800 in quantities up to 25, the firm said.

Infonational "Money" Systems are solving problems for 65 companies. Today.

What we did for them,
we can do for you.
Tomorrow.

Infonational "Money" Systems will take your raw, unorganized financial data and translate them into valuable information for your management. Information that will increase efficiency, profitability, manpower and hardware utilization—every sales.

We have General Ledger, Accounts Payable, Accounts Receivable, Sales Analysis, Fixed Asset and Report Writer systems. According to your needs you may install one of them, all of them, or any combination.

We install these systems in a fraction of the time at a fraction of the expense of doing it "in-house." We've done just that for more than 65 major corporations who have more than 100 of our systems, working for them in locations from Hawaii to England. And we had those systems in and working flawlessly in a matter of days, not months.



If your company's money needs a proven, accounting and financial reporting system devised by business professionals, call us! We are ready to start Infonational working for you tomorrow.

INFONATIONAL

620 "C" Street - San Diego, California 92101

INFONATIONAL	
Gentlemen: Please send complete data on the financial systems checked:	
NAME _____	
FIRM _____	
TITLE _____	
ADDRESS _____	
CITY _____	
STATE _____	
<input type="checkbox"/> General Ledger <input type="checkbox"/> Accounts Payable <input type="checkbox"/> Accounts Receivable <input type="checkbox"/> Fixed Asset <input type="checkbox"/> Financial Report Writer	

Any media storage cabinet you buy now may be obsolete before it is delivered...

before you buy, find out about the improved storage efficiency and cost advantages of new optimedia™ cabinets

Two years ago we decided that it didn't make much sense to keep designing cabinets that were locked-in to the storage of cards only or tape only or one type of disk pack. So we studied the total media storage problem from all angles and came up with what we believe is the ideal solution, optimedia™ coordinated cabinets can store all types and sizes



of data processing media. They can store them in virtually any combination you desire, and — when your storage requirements change, optimedia cabinets can adapt to the changes. They're sort of a "living" storage system that won't become obsolete or leave you with excess capacity for one medium and not enough for another.

optimedia™ coordinated cabinets have other benefits such as "Action Level" storage that lets you place all media at the most convenient retrieval height, smooth operating roll up doors that open all the way leaving the entire inside fully accessible, and up to 20% extra storage capacity when compared to other cabinets with the same outside dimensions.

So . . . hold up that purchase requisition until you can hear the full story on optimedia™ coordinated cabinets. That way you may avoid buying something that's obsolete before it's delivered.

For the complete story on optimedia™ coordinated cabinets, call your local Wright Line office. You'll find it listed in the yellow pages in all major cities or contact us by writing direct or circling the readers' service number. Wright Line, a Division of Barry Wright Corporation, 160 Gold Star Boulevard, Worcester, Massachusetts 01606.

Wright
LINE

MEDIA MANAGEMENT SYSTEMS



Series 50, 6000 Systems Main Growth Contributors

BOSTON — Honeywell's growth in the past year has been largely in the area of the very small and large computer segments of the market, "while in the small and medium we are down slightly," Stephen F. Keating, Honeywell president, said recently.

Speaking before the Boston Security Analysts, Keating noted that "we think our experience corresponds to the industry booking growth pattern."

In the large-scale class, Keating stated that "Series 6000 systems shipped and on order total 238 central processors at a value approaching \$100 million."

"Since we have no 600s in inventory and those being returned are scheduled for customer well into 1973, the net yield from this product is very high," he added.

In the middle of the line, Keating noted the Series 2000 was introduced 11 months ago and "to date the value of the 265 Series 2000 computers shipped or on order exceeds \$160 million."

New Models Due

In addition, Keating hinted the firm plans to add several new models to the

Foreign Orders & Installations

The State Bank of Czechoslovakia has ordered multiple 620/L-100 minicomputers, multiplexers, controllers and other devices valued at over \$810,000 from Varian Data Machines.

The equipment will primarily act as concentrators and preprocessors in a network linking branch and banks to DP centers in Prague and Bratislava.

Computer Communications, Inc. has sold a CC-7 front-end processor to The Curtis Systems Group Ltd. The system will be used with an IBM 370/168 and 158.

The Banco de Valencia, Spain, has ordered two NCR 300s for delivery early in 1974. The systems will be connected with terminals in 36 branches.

The Commercial Banking Company of Sydney Ltd. has ordered a Honeywell Model 6040 as the first phase of an on-line system valued at \$2 million. The 6040 will be linked to three Model 516s that will handle communications to terminals in 104 branches.

Flint, Borsig has installed a full-store System electronic register system with Pepper-pot readers at a department store opened by Kaufhof Aktiengesellschaft in Leverkusen, Germany.

The Carron Co., Falkirk, Scotland, has ordered an NCR 100 for use in customer order processing, management inquiry and general accounting.

A Univac 1106 is being installed in the computer center at Sisak Steels, near Zagreb, Yugoslavia. Primary applications will include order entry, inventory control and product quality control, as well as cost accounting.

The Spanish Air Ministry has installed two Burroughs Air Traffic Control Systems in Barcelona and Madrid.

The cooperative data center for Dutch savings banks, the Coöperatieve Administratiecentrale voor Sparbanken, G.A., has placed a \$4.5 million order with NCR for 440 NCR 270 electronic financial terminals as part of its program to link 300 savings bank branches.

British Overseas Airways Corp. has installed a new computer system. The Bodicea Optical Page Readers, minicomputers and tape punches to complete the initial phase of the development of the Bodicea computer system.

Recognition Equipment has received orders for its OCR/S 2000 bank document processing systems totaling \$6.9 million from the Danish Postgiro, the Norwegian Postgiro and the Swedish Postal Bank.

Series 2000 line during the coming year.

"It is important to note," he said, "that while Series 2000 was intended primarily to give our customer base a means upgrade, nearly 30% of the orders

Honeywell Speaks Out

received represents systems to supplement existing 200s systems or for new-name accounts.

"In other words," he said, "they do not involve the return of systems in any way."

"We have an average value of the upgrade to the 200s has run approximately 30%. We estimate the net yield on 200s to be running at about 50%. That is not as high as the 6000 yield," he admitted, "but it is quite healthy."

At the end of the line, Keating noted, "the built Series 50 and particularly the Model 58 have been very successful. More than 3,000 Series 50

systems are installed or on order worldwide."

The major reason for the success of Honeywell in the past few years, Keating said, has been the successful integration of the GE computer business into that of Honeywell after the merger two years ago.

"The product fit we forecast came to pass: Honeywell products in the broad medium range; GE products bracketing with small and large computers."

"The geographic fit also worked, combining Honeywell's strength in the U.S., Europe and Asia with GE's strengths in Continental Europe and other international markets."

The combination has also permitted economies of scale, Keating claimed.

"We are able to spend over \$100 million a year on research and development and substantially more than that elsewhere except IBM," he claimed, while noting "this is some \$30 million less than GE and Honeywell were spending separately."

But, he said, "we feel it is better spent

because it now has the broader input of the best of both company's approaches to computer technology."

DP Accounts for 50%

Keating indicated computers now account for roughly 50% of the firm's business with control systems accounting for the rest and "our computer business has increased its contribution to corporate profits since the merger."

Net revenues last year, he added, would run about 15% ahead of last year. "We believe this growth is in line with the industry on a worldwide basis, and therefore we are maintaining or possibly slightly gaining market share."

Keating noted "rental and service revenue have lagged somewhat behind our sales growth during the first nine months of this year."

But, he said, "this trend is reversing now as we make shipments out of our backlog of Series 2000 and Series 6000 orders. We believe our rental and service revenue will increase in the fourth quarter."

The most wasteful equipment you own.

Pencil, paper and clipboard. Useful once upon a time. But today, too slow, too costly, too downright clumsy to use in modern business.

Of course inventory records, production schedules and other data still have to be collected and recorded. But how?

Consider an MSI Source Data Entry System. It eliminates clipboards, keypunching and the handling of punched cards. The delays of mailing or phoning information from one location to another are gone.

Since each unit weighs less than 4 pounds in total, and works on batteries, it

goes anywhere and gives hours of continuous operation. Each portable terminal can store up to 250,000 characters of information.

Data can be sent direct from the terminal over standard telephone lines to your data center for processing. No expensive telephone equipment required. No manual transcribing. No keypunching.

A variety of options are available for display, data verification and recording. You can use them wherever data originates. In the

plant. Across town. Across borders.

MSI will implement a total system that's tailor-made to your operation. We plan and coordinate all installation and see that your staff gets complete on-the-job training.

Our system can put you on more efficient and profitable schedules immediately. We can show you how in 20 minutes right in your office. We invite you now to send for our literature so you can learn more about MSI. You won't be wasting your time. Write to 340 Fischer Ave., Costa Mesa, CA 92627 (714) 540-6600

MSI
DATA CORPORATION





CPU Power

Technician at GTE Sylvania Inc. installs power supply in a CPU — for general-purpose computing — that can retrieve 24-bit words in less than 1 μ sec.

Vendors, Take Note of This Discount!

By Lynn Bateman
Special to Computerworld

WASHINGTON, D.C. — When the Federal Government conducts a procurement, a vendor is allowed to negotiate a price and pay delivery within a standard form, but very few computer industry vendors use this option to their advantage.

What most vendors don't know is that the government is obligated to subtract prompt payment discounts (ppd) from evaluated price in determining a winner of the procurement. It is estimated that over 80% of vendors does not understand ppd sufficiently to take advantage of it. Superficially, this may seem unimportant — not so!

Assume, for example, that a vendor wants to set a selling price of \$20,000 for a particular device. When he bids the device in a government procurement, he should price the item at \$20,105 and allow a 5% ppd if paid in 20 days or less. Generally the government will not accept a ppd of more than 5% on the reasonable ground that a larger discount should con-

stitute a general price reduction.

On the other hand, you can price your device at \$20,000 and offer a 1% 30-day ppd. This is a reasonable position that the government will seldom qualify, so you will be paid the full amount but be evaluated at \$19,800. Even if the government does pay within 20 days, little is lost.

Generally, any time period of less than 20 days is not evaluated because the government cannot be sure that the disbursement section can meet such a short time frame. The time period is governed by Title 41, Public Contracts, Chapter 1 — Federal Procurement Regulations Subpart 1-2.407-3.

In actual practice, the government will take this discount if the bid is paid within 30 days. This is taken after the stipulated time period has elapsed, the contracting officer, when contacted by the vendor, will authorize additional payment by the government to cover this improper action.

In addition to the evaluation advantage provided by a ppd, other advantages accrue.

For example, any disbursing officer will pay those bills offering a ppd first. Hence, you are in a strong position. Another advantage lies in the fact that the device is evaluated at \$20,000, but you collect \$20,105 if the government is late in paying.

So, you can't lose with a ppd.

Another item to consider is rental credit.

Suppose a particular procurement has as part of the evaluation criteria some form of rental credit. You can offer the rental and suggest that it applies before the ppd is taken. In this manner your proposal earns a percentage of the 5% ppd in evaluation credit.

One last note: the human interest side of the deal — an government contracting officer will have the cockles of his heart warmed to see a ppd. When it appears in a proposal, it is like cookies from home. He feels he is getting something free. Give it to him. You can't lose. The only time you can lose is when he ignores this regulation.

Lynn Bateman is with Federal Marketing Counsellors, Inc., Arlington, Va., a firm which assists DP companies with their federal marketing efforts.

Orders & Installations

The National Aeronautics and Space Administration has ordered a Univac 1110 system to replace two 1106s and two 1107s. The 1110 will serve as front end and job scheduler for four 1108s. During Skylab missions, the system will handle data acquisition and reduction via a wideband and narrowband computers link between the 1110 and NASA computers in other locations.

Irid Corp. has installed 1 Mbyte of main memory on a 370/155 at Scott Paper Co., Philadelphia.

Ocean Products, Inc., Dover, Fla., has ordered an NCR 101 to monitor sales, inventory and accounting of its breaded and frozen shrimp.

Rensselaer Polytechnic Institute has installed an Information Displays, Inc. Iridion computer-driven display system in its School of Engineering. The unit will be used to investigate the use of interactive graphics in a variety of process control applications.

The Rochester Institute of Technology has installed Datatype Corp.'s Setype (OCR) system at its school of printing for use in vocational instruction classroom.

The Associated Press has ordered 300 data TE-1200 modems from Collins Radio Co. for installation in AP offices around the nation.

Mean Data Corp. has installed 20 Editor 100 intelligent display stations and ordered 40 additional units from SVS Computer Corp. The units will be installed in accounting firms and the Securities & Exchange Commission.

The Cabell Huntington Hospital, Huntington, W. Va., has installed an NCR 50 to handle business applications.

The Grand Union Co., a supermarket chain, has licensed the Acres telecommunications package from Trilog Associates, Inc.

Galaxy Foods, Inc. is installing a computerized order entry and delivery system developed by Incotel, Ltd. The system uses a Varian 620/L-1000 mini and modular.

Northeast Medical Suppliers has ordered C1-2 minicomputers from Computer Interactions, Inc. for installation at all the firm's locations, where the units will keep patient records, handle medical history records. The systems will also be used to alert personnel to possible harmful reactions caused by mixing different prescription drugs.

On January 31st,
Computerworld shows
"How to upgrade
your 360."





Minicomputers, we've got you surrounded.

So take a closer look. The MDS family of OEM peripherals is growing.

Newest is the 2021 cartridge tape drive, first in the industry to use 3M's versatile data cartridge.

Almost as new is the 100 cps impact matrix printer, and the 2 to 8 million bit head-per-track disk drive, and our auto-loading, 12.5 ips vacuum-buffered tape drives, plus a 400 cps serialsense card reader.

They add even greater muscle to Mohawk's existing line-up of equipment that helped make us the Peripheral Power.

Products such as a 300 or 600 lpm chain printer, a clean-picking 225 to 600 cpm card reader, a multitude of proven digital lister printers, and slow speed, low-cost paper tape readers and punches.

Doesn't that sound like plenty of reason to start a conversation? Good.

You call. We'll come. Phone us at (215) 337-1910.

Or write OEM Marketing, Mohawk Data Sciences Corp., 781 Third Ave., King of Prussia, Pa. 19406.

MDS.
The Peripheral Power

DFI
LEASES *
"CREAMPUFFS"

1316's 3336's
2316's 5440's
2315DD's
2315's

et al, etcetera, others and so forth

*We sell'em, too!

Call . . .
Martha Washington
Data Funding, Inc.
2 Industrial Boulevard
Paoli, PA 19301
(215) 647-5040

'Used' Market Gets Group Voice

KANSAS CITY — A trade association formed to give voice to the used computer dealers was formed by 34 firms meeting here recently.

The Computer Dealers Association "will be the voice to mainframe manufacturers, leasing companies, independent peripherals manufacturers, the U.S. Government (to help the government expand its understanding and acquisition of used computers and peripherals), freight forwarders, insurance companies and third party maintenance companies," the organizers said.

Broaden Market Awareness

The group "will also strive to broaden the computer users' awareness of the billion dollar used computer market," the founders added, noting that of the approximately \$30 billion in computer-related installed equipment, \$10 billion is owned by non-manufacturers.

President of the new organization is L.A. Hirsch, president of American Used Computer Corp. and the vice-presidents include Edward Cherney, president of CM1 Corp., and Norman Burger, president of Corporate Computers Inc.

Founded, the membership includes, in addition to the above, Associated Computer Services Equipment Corp., Comdisco Inc., Computer Resale Exchange, Computer Resale Corp. Ltd., Computer Systems/Graphics Inc., Computer Trade Corp., Computer Wholesale Corp., Comshare, Information Systems and Data Automation Services.

Others are: DP Equipment Marketing Corp., Dataserv Equipment Inc., Econocom, Evergreen Computer & Financial Inc., Forsythe/McArthur Associates, Inc., The Gandy Corp., Interdata Corp., ICC Computer Corp., I.O.A. Data Corp., IPS Computer Marketing Corp., M.L. Johnston & Associates, Inc., Luncerford & Associates, Inc., LXX Computers & Peripherals, Inc.,

Inc., George S. McLaughlin Assoc., Inc., William Marion Co., Nationwide Computer Corp., National Data, Inc., and Associates, Professional Reselling Organization, Thomas Computers, Time Brokers, Inc. and Trade-
comp, Inc.

Information Systems
Expected to Fill
Needs of Utilities

LAKE ERIE VISTA, OH — Computerized information systems are needed as in the nation's electric and gas companies as their business environment becomes more political and complex, according to Leonard A. Muller, president of GTE Information Systems.

Speaking at the 20th annual Public Utility Information Systems Conference here, Muller said, "Management decisions can no longer be made unilaterally, but are increasingly subject to public scrutiny and review.

"Customers are becoming more system-oriented, using computers to study problems that were formerly considered solely in the realm of management."

At the same time, Muller noted the computer industry was also changing with more and more of the DP dollar being spent outside the computer room.

"While technology has given us the capacity to centralize with huge data bases," he said, "we must now provide access to decentralize with intelligent terminals and distributed networks that are more responsive to the end user.

"The most important long-term effect of our data communications systems will be decentralized systems, with more computer power in the hands of the end users, the people who need it," he added.

Next May,
we're opening
the world's second
largest computer
market.

Our new European Computer Caravans will bring your products or services within a hundred miles of 85% of European Computer users. The U.S. Computer Caravan is a proven success. And now we're taking the concept to Europe — with three European Computer Caravans. If you now market in Europe, you'll find your present and future customers attending the Caravan. And you'll be able to deal with them in an effective way, no matter where.

If you aren't currently marketing in Europe, you're missing a \$4 billion market. And we can help you break into it. With our new Computer Caravans — and with a variety of optional services, including:

- overall market data
- customized marketing research through IDC, the world's largest EDP research organization
- advice on how to get government help
- expert booth staffing to identify prospects and screen potential representatives

That's just the overview. Why don't you get the whole story by writing or calling Neal Wilder or Dottie Travis (617) 332-5806. They'll be glad to give you a copy of our free brochure.

French Market
Caravan
May 1-June 7, 1973

Paris
Bordeaux
Marseille
Lyon
Strasbourg
Brussels

English Market
Caravan
Sept. 4-Dec. 18, 1973

Stockholm
Oslo
Copenhagen
Amsterdam
Glasgow
Montreal
London

German Market
Caravan
Oct. 23-Dec. 6, 1973

Hamburg
Dusseldorf
Frankfurt
Stuttgart
Munich
Berlin

The European Computer Caravans

sponsored by



COMPUTERWORLD

797 Washington St., Newton, Mass. 02160



Dorothy Tucker
wouldn't be
where she is today
without ACM.

Or moving ahead as fast.

Dorothy Tucker is Chairman of the New York City Chapter of ACM. She's also Internal Training Consultant for the Computer Systems Department at Bankers Trust, a position with considerable management responsibility. She's involved in a highly sophisticated in-house training function, keeping managers and systems analysts in one of the largest banks in the country up-to-date on the latest trends and techniques in data processing education.

"I wouldn't be in this job if it weren't for ACM," says Dorothy. "I had been involved in DP education and marketing for a number of years. My ACM Committee work and chapter meetings resulted in a lot of additional contacts. One of them led to this job."

"Since joining the bank, I've found my activity in ACM helps me do my job better. It's not just keeping up with the state-of-the-art. It's reinforcing the professionalism of our field. And using

my leadership experience in motivating volunteers at ACM to do a better job in DP training work at Banker's Trust. I really think ACM has helped me find—and grow in—a new, satisfying career.

Dorothy Tucker has more than enough ability to do her job well. Being active in ACM gives her something extra.

Look into joining ACM now. Send in the coupon today.

Association for Computing Machinery
1133 Avenue of the Americas
New York, New York 10036

I would like to consider joining ACM.
Please send more information.

Name

Position

Address

City State Zip

acm

Association
for Computing
Machinery



TOUGH—inside where it counts. We've taken the cover off so you can see for yourself. Rugged, durable construction for heavy-duty use. Just three simple moving assemblies and advanced integrated circuitry. No cams, no complicated linkages, and no oscillating ratchets commonly hidden inside other asynchronous impact printers. You get improved reliability and longer life. And the best part is that there are no extra...unlimited life. (Any assembly that fails can be replaced in a half hour...or less using a screw driver and wrench.)

All this plus tough-to-beat features: optional selectable 110, 150 or 300 baud transmission; optional duplex local operation; upper and lower case printing; odd, even or no parity error detection; form-feed tractors that adjust from one to 16 inches and 132 columns; six-part copy; RIO, KSR, and ASR versions.

Three years in-house design and the most intensive field testing precedes production. We KNEW it works.

Write for complete details.
DI-AN CONTROLS, INC.
944 Dorchester Avenue
Boston, Massachusetts 02125

frequency division multiplexer

FEATURES . . .

INDICATORS: Multi-colored display panel provides indication of four control and two data functions.

MULTI-DROP: Drop one or more channels at a number of locations.

MULTI-ACCESS: Multi-drop channels have equal opportunity contention for processor channels.

BUSY-OUT: Busy-Out control of remote modems.

LOOP-BACK: Test feature provides rapid system diagnostics.

DATA RATES: Mix 110, 150 and 300 baud channels.

CONTROLS: Processes all modem control functions.

VOICE-PLUS-DATA: Simultaneous voice channel with four data channels.

OPTIONS: Many other optional features.



SAVE 4-WAYS

- 1 No high speed modems required.
- 2 No private line conditioning required.
- 3 Modular construction permits sharing of one channel and adding others as needed.
- 4 Eliminate long distance phone calls with voice-plus-data.

\$465 BASIC

\$15.80 PER MONTH*

\$325 PER CHANNEL END

\$11.00 PER MONTH*

*3 Year Lease with Purchase Option

Send for
FREE Brochure
today.

Data Channel Concentrators and Expanders, Modems,
Line Test Units and other Data Communication Equipment



ComData CORPORATION

1000 19th Street, N.W., Washington, D.C. 20006 • (202) 342-1000

Industrial Robot Uses TV Camera, Mini to Store Images for Selection

TOKYO—Hitachi has developed an industrial robot system that can recognize and select specific objects from a mixture passing by on a conveyor belt.

The Hitachi Visual Image Processing Robot uses a television camera attached to a television able of storing 32 images. In the selection process the camera scans the objects and feeds the data on the images to the computer. The systems can discern shape, size, position and posture

of the objects.

The pattern is compared by the computer with the patterns in memory and if action is needed, an order is given to the handling mechanism.

To store images in the system, the object is placed below the camera and a special function key is pressed causing the object to be stored. When the belt is moving, Hitachi said the system could recognize objects at the rate of around one second.

Contracts

Advanced Memory Systems Inc. has received a contract valued at over \$1 million from Micro-Technology Inc. for the AMS 6003, a 2 K word by 1 bit, P-channel dynamic RAM.

Vogue Instrument Corp. has received a contract from Emerson Electric Co. for 65 Model 400C High-Speed Line Printers for use in a computerized label printing system.

General Electric Co. has received a contract from the Federal Maritime Administration to develop a satellite-aided merchant ship operations control system. The system will use a shipboard computer linked through orbiting satellites to a shore-based computer.

TRW Data Systems has agreed to purchase a minimum of 100 Computerized Control Corp. Data-point 2200 systems over the next two years. The units will be used as part of an on-line credit verification system for the retail and banking industries.

Georgetown University Hospital, Washington, D.C., has selected Compuware, Inc. to provide facilities management services.

Computer Sciences Corp. has received a \$3.1 million Army contract for programming for the Safeguard System. Compuware will be the Army Ballistic Missile Defense Agency.

International Telephone & Telegraph Corp.'s Defense Communications Division has received a \$7 million Army contract for a prototype communications switching system. Burroughs Corp. is a subcontractor.

Datascraft Corp. will supply Boeing Co. with four DC 6024/5 computers for use in real-time simulators for the B-1 bomber program.

AMI Corp. was issued a \$5.3 million Air Force contract for computer test sets for F4 aircraft.

AMI Industries, Inc. has received a contract from the First National City Bank of New York for data processing of its direct marketing activities.

Bunker Ramo's Electronic Systems Division has received a contract from McDonnell Douglas Automation Co. for the development of a factory data entry system. The system will be installed initially at the Douglas Aircraft Co., where it will be used to enter production and tooling orders into the central data system.

System Development Corp. has been awarded a \$10.5 million contract to convert its computer program integration contractor for the Air Force Satellite Control Facility (AFSCF).

IT'S ALL IN THE FAMILY



Throughput gains. Reliability. Dollar savings. Versatility. Cost effective solutions to 96 column data preparation problems. All in Decision Data's family—9601 Data Recorder, 9610 Interpreting Data Recorder, 9660 Sorting Data Recorder, and the 9620 Alphanumeric Sorter.

Since we can tailor each machine to your specific requirements just as you configure your system. And since family benefits last as long as you keep your computer, it's important to know that Decision Data gives you a choice. Between machines and suppliers.

THE FAMILY: 4 SuperMachines from Decision Data.

 **DECISION DATA**
9601 Data Recorder • 9610 Interpreting Data Recorder
9660 Sorting Data Recorder • 9620 Alphanumeric Sorter
11000 19th Street, N.W., Washington, D.C. 20006 • (202) 342-1000

We've drawn a blank, you can fill it in.

order your own subscription

Please send me COMPUTERWORLD for:

1 year — \$5*

*\$10 a year in Canada; all other
Foreign, \$25 a year.

Charge My American Express Account:

_____|_____|_____|_____|_____|

If charge, we must have cardholder's signature:

December 13, 1972

First Initial		Middle Initial		Surname	
Your Title					December 13, 1972
Company Name					
Send to:					
Address					
City		State		Zip Code	

Address shown is: Business Home

Check here if you do not

wish to receive promotional

mail from Computerworld.

COMPUTERWORLD • Circulation Department • 797 Washington Street • Newton, Mass. 02160

PLEASE CIRCLE 1 NUMBER IN EACH
CATEGORY

YOUR INDUSTRY

- 01 Mining/Construction/Oil & Refining
- 02 Manufacturing - Computer or data system hardware/peripherals/other electronic components/other
- 03 Manufacturing (other)
- 04 Utilities/Comm. Sys./Transportation
- 05 Wholesale/Retail
- 06 Manufacturing-Real Estate
- 07 Of Serv. Bureaus/Software/Planning
- 08 Business Services (except DP)
- 09 Education/Medical/Legal
- 10 Federal, State and Local Government
- 12 Communications/Printing/Publishing
- 13 Other:

YOUR FUNCTION

- 01 Corporate Officer
- 02 Data Processing & Operational Management
- 03 Data Processing Professional Staff
- 04 Consultant/Analyst
- 05 Lawyer/Accountant
- 06 Engineering-Management/Scientific/R&D
- 07 Sales/Marketing/Account Executive
- 08 Librarian/Educator/Student
- 09 Other:



COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

DP Lagging in Bahamas

By Bohdan Szprowicz
Special to Computerworld

NASSAU, Bahamas — Although there are 354 different banks registered in the Bahamas and several top U.S., Canadian and British banks have branches here, in Freeport, there are only a dozen small- to medium-sized computers in all of the 700 islands. Only one, a small IBM System 3, is reportedly installed in a local Nassau bank.

"What's incredible," said A. Ross, vice-president of Caribbean Computers Ltd., "is that the banks here are not even using magnetic code on checks and most operations are done manually."

Another computer firm, Data Management Ltd., is proposing setting up a time-sharing system for groups of participating banks but became discouraged when little interest was shown.

Computerization of Bahamian banks is not the only objective of Caribbean Computers Ltd., which started operations only last March as a computer services firm and is the authorized distributor for Honeywell computer hardware in Bahamas, Jamaica and other Caribbean areas.

H-58 Bought

Three months ago the company sold a small Honeywell H-58 system to a hotel chain and included in the package special software for hotel reservations, billing and accounting functions. Ross sees considerable potential for this system, which he feels is price accessible for many smaller hotels throughout the Caribbean area.

Even in the industry there is little computerization so far, as many large hotels belong to international chains and use only a communications terminal.

Only Kings Inn in Freeport operated a local IBM 360/20 200 days previously until a year ago when the hotel and its computer were destroyed in a fire. The hotel is opening up again this coming season with an IBM S/3 as a replacement.

The initial government installation quickly expanded to an IBM 360/65 system which is now being replaced by an IBM 360/30 with 96K of memory and five terminals. The new system will handle immigration, payroll and utilities billing as well as customs duty applications.

Aussies Use Mini In Stress Grading

Special to Computerworld

SYDNEY, Australia — A mini-computer, designed and built in Australia by Plessey Telecommunications Ltd., a division of the London-based New South Wales, is bringing home the export dollars.

Part of a timber stress grading machine, the mini has been sent to New Zealand, Japan, South Africa, the Philippines, the U.S. and the U.K. as well as Australia.

Using a simple machine programmed by insertion of one of a selection of circuit cards, its application has brought an optimism to Australia's growing DP industry.

The grading machine is one of few to be approved in the U.K. and the U.S. by timber research and building code authorities.

Timber passing through the machine is subjected to a known load and deflection measured at six-inch intervals. The mini does the necessary calculations and allocates one of five grades to each section tested.

Position Announcements

SALESMAN WANTED

Leading computer ribbon manufacturer seeks experienced Sales and Managerial personnel, representatives, etc.

Excellent opportunities for men now seeking computer ribbon, typewriter ribbons and computer tape.

CW Box 2733

600 Austin Street

Newtown, Mass. 01860

SYSTEMS ANALYST

Applicant credentials are a B.A. degree (preferably business or mathematics) plus 35 years experience Cobol OS/MFT and disk file processing.

Send complete resume including salary requirements in confidence to:

Mr. Al. Perry
Staffing Office
University of N. Iowa 50613
Cedar Falls, Iowa 50613

An Equal Opportunity Employer

ENGINEERS and COMPUTER SCIENTISTS

Our developing programs have created these exceptional openings in California and in Buffalo, New York.

NAVAL COMPUTER SYSTEMS ENGINEERS RADAR SYSTEM ENGINEER SOFTWARE DEVELOPERS

(Test planning and direction of complex computer/electronic systems)

RADAR SYSTEMS ANALYSTS

(Radar target designation and discrimination; development of statistical estimation and decision techniques; parametric systems studies)

COMPUTER SOFTWARE ENGINEER

(Development and implementation of software for integrated avionics computer complexes)

DIGITAL SIGNAL PROCESSING ENGINEER

(Digital processing, real time simulation, digital logic machines and radar systems)

Positions Listed Require Security Clearance

We invite you to:

EXPLORE THESE OPPORTUNITIES

AT THE • FALL JOINT COMPUTER CONFERENCE

Phone: L.A. Answering Service

(213) 461-4646

(WE WILL ACCEPT COLLECT CALLS FROM AREA CODES

714 and 805)

or

By Mail — Send complete resume to:

Mr. F.J. Severance, Employment Manager

(213) 461-4646

An Equal Opportunity Employer/Male and Female

An Equal Opportunity Employer/Male and Female

Calspan Corporation
(Formerly CORNELL AERONAUTICAL LABORATORY, INC.
P.O. Box 235, Buffalo, New York 14221
An Equal Opportunity Employer/Male and Female

POSITION ANNOUNCEMENTS

DIRECTOR, College Computing Center

Director is responsible for expanding educational use of computer and for general administrative oversight of the College Computing Center. Qualifications: IBM 360/65. College teaching experience and administrative experience. Position available Summer, 1973. Send detailed resume to: Associate Dean of Administration Grinnell College Grinnell, Iowa 5012

Programmer/ Analyst

Male or female needed for 85000/student information system. Two years COBOL required. ALGOL helpful. Send resume with salary requirements to:

Personnel Office
University of Oregon
Eugene, Oregon 97421
An Equal Opportunity
Affirmative Action Employer

FACULTY POSITIONS

Computer Science and Technology

Teaching and research opportunities: (1)

Business applications specialist with advanced degree; (2) Ph.D. in Computer Science for similar field; (3)

Experienced applications or industrial/commercial applications) for a 3 mo. to 1 yr.

Internship program — professionals on sabbatical leave, one year.

Send resume to: Dr. John G. Gutter

Rochester Inst. of Tech.
One Lomb Memorial Drive
Rochester, N.Y. 14623
(716) 464-2111

Apply to:

Mr. Al. Perry

Staffing Office

University of N. Iowa 50613

Cedar Falls, Iowa 50613

An Equal Opportunity Employer

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and cost-of-living adjustments.

Further particpants are available from: Commonwealth Computer Corporation, 36 George Street, Cambridge, Ontario, Canada N1R 1B6; sterling: \$119; (001) 500. Salary scales are subject to both financial and

FIELD SERVICE ENGINEERS

Familiar With
the 360 & 370

There are unique opportunities with a rapidly growing data plant of the computer peripheral industry. CMI has a fine reputation and has achieved excellent acceptance throughout the world for its product line.

Our Technical Support Center has need for Field Service Engineers at all levels of experience at various locations throughout the U.S. and Europe.

Responsibilities will involve performing installations, maintenance and repair on CMI products. You may also perform design engineering liaison and training.

Please call collect: 617-369-6850, or forward your resume to: D.C. Turner,



An Equal Opportunity Employer

Buy Sell Swap

UNIVAC 1108 SYSTEM Sale or Lease SUBSTANTIAL SAVINGS

*85K or 131K Core Configuration
*Multi-Processor Capability
Core Processor 3754
60 Assets Standard
Newton, Mass. 02160

FOR SALE

14 used 3021 Storage Cells
for an IBM 2321
Computer System
of the Controller
Data Processing Operations Division
Clark County Courthouse,
200 East Market Street
P.O. Box 1000, Room 101
Attn: G.A. Jaenische, Mgr.
(702) 386-4011 Ext. 294

FOR SALE/LEASE

UNIVAC 1004/1005
PROCESSOR AND 1004
CARD PUNCH, WIRE
BOARDS AND 1005
MODULES INCLUDED.
CONTACT
J. SHIPP
(301) 342-7800

EXCLUSIVELY OURS FOR SALE FOR LEASE

Deutsche Data Company
15 Laramie Avenue
Westport, Conn. 06880
(203) 222-1211

FOR SALE

CUMMINS
CONDITONER
\$2400.00

Call 503-232-7069

FOR SALE

360/50 H

(256K)

OR LEASE

with UPGRADE
PRIVILEDGE
TO 360

SYSTEMS EQUIPMENT LESSORS INC.

[203] 661-2700

For Sale or Lease

Need 30K Memory Stack

for B2500/B3500
(Purchase Only)
Write giving details
and price to:

P.O. Box 1416
San Antonio, Texas 78295

Computerworld Sales Offices

Vice President — Sales

Neal Wilder

Sales Administrator:

Dorothy Travis

COMPUTERWORLD

797 Washington Street

Newton, Mass. 02160

(617) 332-5606

Los Angeles Area:

Bob Byrne

Robert Byre & Assoc.

1541 Westwood Blvd.

Los Angeles, Calif. 90024

(213) 477-4208

San Francisco Area:

Bill Healey

Thompson & Healey Assoc.

1111 Hearst Blvd.

San Francisco, Calif. 94103

(415) 362-8547

Northern Regional Manager

Robert Ziegel

COMPUTERWORLD

797 Washington Street

Newton, Mass. 02160

(617) 332-5606

Mid. Atlantic Regional Manager

Donald E. Fagan

COMPUTERWORLD

225 West 34th Street

Suite 1511

New York, N.Y. 10011

(212) 594-5644

Japan:

Yoshi Yamamoto

Nippon Keisoku Inc.

P.O. Box 410

Central Tokyo, Japan

QUALITY IS WHAT WE'RE ALL ABOUT!!!

The results? International leadership in the design and sale of IBM 360/370 computer systems. If you are considering the purchase or sale of used IBM 360/370 computer systems, call us. In the international leader in this highly specialized field, we are the ones you should be concerned with quality? Because we think that doing business with you should be a pleasure.

- Lower Costs
- Guaranteed IBM
- Maintenance Agreement
- Fully Restored
- Timely Delivery
- Site Engineering

Write or phone for details:
Pat Baker—Domestic/
Dale Johnson—International
1600 K Street, N.W., Suite 201
Washington, D.C. 20036
(202) 466-2244

ICX

FOR SALE OR LEASE

360/20 30

1401/2/3/6



CONTACT: FM Brooks
BROOKS
INTERNATIONAL, INC.
2731 Luddells
Fort Worth, Texas 76105
(817) 531-2761

WANTED

IBM 360/20
D2 SYSTEM

NCR 395, 400

BURROUGHS
E4000, L2000

Call Smart Rubenstein
I.O.A. Data Corp.
1851 Lafayette St., N.Y. 10001
(212) 673-4100

SYSTEM 360/370

dearborn
computer leasing
corporation

A business relationship you can't afford to be without...
...

- Lease Terms to Fit Your Needs
- Field Engineering Support
- Systems Engineering Support
- Well Trained Marketing Staff
- Leasing and Sale 360...
• Subleasing
- Computer Leasing Options

Dearborn Computer Leasing Corporation
a subsidiary of Dearborn Storm

4849 North Scott Street / Schiller Park, Illinois 60116 Area 312 / 671-4410

We Need:

360's
All Models

2314-1
1419-1
2821-1
2311-1

BUY SELL LEASE

360/40-128K
360/50/256K
360/30-64K System
2540, 2821-1, 1403 N1
2803 II, II, 2401VI,
2314 I,

FOR BETTER VALUE LOOK TO:

cac COMPUTER ACQUISITIONS COMPANY

P.O. Box 80572, Atlanta, GA 30341 • (404) 458-4425

370 LEASING

- new or installed CPU's
- flexible upgrade capabilities
- guarantee savings on upgrades

Analysis International Co., Inc.

consultants - marketing - leasing

charlotte, n.c. 28209 area code 704-523-6812

4630 park rd

BUY-SELL-LEASE

1130's

Are you considering buying, selling, or leasing your data processing equipment? Consider Econocom. Our proven staff of highly trained professionals can assist you in all areas — Buy, Sell or Lease. Contact us today — let us show you how we can help you gain the most from your data processing investment.

FOR SALE

360/40-128K or 256K

2 Channels

1401 Compatibility

1403-N1, 2540, 2621

1130-2C-16K

3816

#3816

#4544

360/20

Card Disk

Configurations

Available

ECONOCOM A DIVISION OF ECONOCOM INDUSTRIES INC.
P.O. Box 16902 • 2221 DEMOCRAT ROAD
MEMPHIS, TENNESSEE 38116 • PHONE 901-380-8100

BUY SELL SWAP	BUY SELL SWAP	BUY SELL SWAP	BUY SELL SWAP	BUY SELL SWAP
<p>FOR SALE IBM 360/370 UNITS 2702 Transmission 20 Data Set Lines 1.5, 3, 6, 12, 24, 36 3211/2641 Disk Controller 2420/7 Magnetic Tape Drives 2401-5 Magnetic Tapes Memory MAI 2405 1620/2640 Power Window 1580/2005 Data Processor 1500/2005 CPM CALL: (617) 227-8834 FOR SALE: IBM 360/370 Computer Peripheral or Telephone Price List American Standard Computer Corp. 1200 Washington Boston, Ma. 02108</p> <p>OAS FOR SALE OR LEASE 360/370 & 320/330 Systems 1401, 1440, 1620, 2311, 2641, 3211, 3641, 3642 All Types Unit Record LEASE OR LEASE PURCHASE Two 1401-5 with 75% Options 12K, 24K, 29K CALL or WRITE Data Automation Services, Inc. 4830/4900 N. Central Dallas, Texas 75247 (214) 348-1200 318 W. 28th Street Los Angeles, Calif. 90007 (213) 483-1200 7750 N.W. 7th Avenue Miami, Fla. 33150 (305) 683-3811</p>	<p>FOR SALE OR LEASE 19M 231-1 Disk Drives IBM 1401 4K to 12K Systems Savings in the Thousands. *** D.P. Equipment Marketing Corp. 260 W. Broadway, N.Y. N.Y. CALL (212) 925-7337</p> <p>FOR SALE Calm Digitizer Model 485 Calcomp Tape Drive Model 100 Honeywell Series 200 Model 125 Romulan Industries P.O. Box 655 Santa Clara, CA 95050 (408) 248-7282</p> <p>We buy and sell G.E. computers and peripherals Have over 22 400 Series CPU's. Also PC Cards and Peripherals for 200 Series and 600 Series. We maintain most G.E. equipment.</p> <p>Call Greg Hunter at (401) 278-9006 Or Doug Robinson at (401) 278-9033</p>	<p>DATASERY BUY...SELL...LEASE Systems & Components 1401 Systems WATSON 1401 360-30V 1.5 and 2.0 mic 2401-5 1.5 and 2.0 mic FOR SALE 1419-1 Mem. Char. Reader Inscriber (Qty. 7) Avail. Immed. Price List Phone (612) 546 4422 1401 Systems para mpls minn 5000</p>	<p>1620 Card and Disk Systems FOR SALE Available Immediately Call for our special low prices CPI 1620 1620 BE, Warner Avenue Detroit, Michigan 48224 (313) 889-0440</p> <p>NEED TO BUY 360/28 Kard System 360/30 16K-32K-64K IBM Core Boxes 361/30-40-50 Computer Sales, Inc. 2809 N.W. Expressway Oklahoma City, Okla. 73112 (405) 848-7181</p>	<p>1620 Card and Disk Systems FOR SALE Available Immediately Call for our special low prices CPI 1620 1620 BE, Warner Avenue Detroit, Michigan 48224 (313) 889-0440</p> <p>NEED TO BUY 360/28 Kard System 360/30 16K-32K-64K IBM Core Boxes 361/30-40-50 Computer Sales, Inc. 2809 N.W. Expressway Oklahoma City, Okla. 73112 (405) 848-7181</p> <p>WANTED IBM 2560 With or W/O Print Data Service Ctr., Inc. P.O. Box 2540 Toledo, Ohio 43606 (419) 479-5304</p>
<p>Before you Buy—Lease—Sell 360 65 or any 360 or 370 equipment call or write</p> <p>we have a new concept in leasing</p>	<p>Before you Buy—Lease—Sell 360 65 or any 360 or 370 equipment call or write</p> <p>we have a new concept in leasing</p>	<p>FOR SALE 2314-1 2540 1403-N1 Write: CW Box 3755 60 Austin Street Newton, Mass. 02160</p> <p>WANTED TO PURCHASE 1442 Card Punch Model N1 or N2 CIS CORPORATION 700 East Water Street Syracuse, New York 13210 (315) 474-5776</p>	<p>FOR SALE 2314-1, Feb. 2415-2, Dec. 2030 F, Feb. 2044-G, Dec. With Commercial Feature 1401-C6 Syst. Disk &/Or Tape</p> <p>WANTED 1440 System Disk &/Or Tape</p>	<p>FOR SALE 360/651 available December delivery. Will also supply as 360/65H. Lease, sale, or lease with purchase option.</p> <p>IPS IPS COMPUTER MARKETING CORP. 467 Sylvan Ave., Englewood Cliffs, N.J. 07632 (201) 871-4200</p> <p>FOR SALE BY OWNER 370/145 213 or 262K December 360/30 32K January Full complement of features December Full complement of features February</p> <p>CONTINENTAL INFORMATION SYSTEMS 700 East Water Street, Syracuse, New York 13210 (315) 474-5776</p>
<p>360 MARKETPLACE BUY·SELL·LEASE</p> <p>360 30-64k CPU 360 40-128k or 256k 360 50 core 256k</p> <p>2301 DRUM STORAGE 2820 CONTROLLER</p> <p>TLW COMPUTER INDUSTRIES 3570 American Drive Atlanta, Georgia 30341 404/451-1895</p>	<p>WE ALSO HAVE TAPE DRIVES, DISK DRIVES & OTHER PERIPHERAL EQUIPMENT.</p> <p>Offices in Chicago 222 E. Wisconsin Avenue Lake Forest, Illinois 60045 (312) 295-2030</p>	<p>FOR SALE HONEYWELL 200, 1200 and 1250 CPUs MEMORY PERIPHERALS Examples: 8K Memory Additions \$7600 2048-2 20K Tape Drives \$4000 And Many More IMMEDIATE DELIVERY CALL: (617) 227-8834 We BUY any Computer Peripherals Send for FREE Price List American Standard Computer Corp. 15 East 20th Street Boston, Ma. 02108</p>	<p>FOR LEASE or SALE 256K 360/40 also available as 128K or 192K READY TO SHIP</p> <p>Two Selector Channels, Decimal Arithmetic, Floating Point Arithmetic, 1401/1460 Compatibility, Storage Protect, and 1052-7 Consol.</p> <p>Outstanding Lease Plan, Or Outright Purchase</p> <p>LUNCEFORD & ASSOCIATES (513) 881-7772 Vally View Bank Bldg Cincinnati, Ohio 45212</p>	

Anderson Jacobson Earnings Rise 65% in Half, Revenues Set Record

SUNNYVALE, Calif. — Anderson Jacobson, Inc. chalked up its fifth consecutive new high for revenues in a six-month period, with earnings up 65% over the year-ago period. Incoming new orders ran 32% ahead of orders for the same period last year, according to the firm.

Revenues for the half year ended Sept. 30 reached \$2.5 million compared with \$2 million in 1971, while earnings, including a \$3.2 million provision for tax to \$162,694 or 6 cents a share, compared with \$76,061 or 3 cents a share in the 1971 period.

A gain in second-quarter revenue and earnings was achieved despite the fact that outgoing sales in the quarter were "unusually high" because of a bulge in OEM sales, according to President Raymond E. Jacobson.

In the three months, revenues rose to \$1.3 million from \$1.2 million, and earnings to \$75,182

or 3 cents a share, from \$52,926 or 2 cents a share.

Jacobson explained to shareholders that Anderson Jacobson's product line of couples, modems and keyboard peripherals is not computer peripheral equipment in the true sense of the word, but the firm is more a part of the "data communications" world.

Commenting on the industry, Jacobson said: "Even companies that are not building modem equipment, there are, at this point, no strongly dominant companies in the computer terminal and data communications field as there are in the computer mainframe and peripheral field."

"We believe, therefore, that while competition is keen in our business, independent companies like ours can compete very effectively and that we shall grow substantially."

Inforex Has Profitable 9 Months

BURLINGTON, Mass. — Key-to-disk market Inforex has put two profitable quarters back to back, and showed a profit for the nine months ended Sept. 29.

With a healthy boost from \$1.9 million in new orders under the Leasing II, Inforex earned \$55,220 or 23 cents a share, compared with a loss of \$1.4 million or 74 cents a share in the comparable 1971 period.

The 1972 figure includes a \$278,000 write-down.

Revenues for the quarter rose to \$6.1 million from \$1.2 million in the same 1971 period.

Rental Revenues Up

Rental and service revenues for the nine months were \$2.5 million, up 25% over the previous quarter, and over three times the amount for the third quarter last year, President T.B. Horgan noted.

Order backlog totaled \$10.7 million in the quarter at the end of September, compared with \$8.2 million a year ago.

In the nine months, earnings, including a \$453,000 tax credit,

totaled \$535,083 or 23 cents a share, compared with a loss of \$3.8 million or \$2.05 a share in the 1971 period. Revenue rose to \$15.8 million from \$2.8 million a year ago.

Remcom Sets Financing

GARLAND, Texas — About \$17 million in financing has been arranged through American Computer Corp. and Industrial Leasing Corp. for Remcom Corp., a subsidiary of SCS Corp.

Under the agreement the two firms will purchase Remcom equipment, subject to lease with Remcom customers. Remcom will retain distribution and service responsibilities.

The lease financing will cover Remcom's production of remote batch terminals from now through 1973, SCS said.

The agreement includes about \$16 million in lease financing from the two firms and the sale of \$750,000 of convertible debentures to Transamerica.

CONVERSION

2 MIC 1.5 MIC

You can Convert your Model 30
At a Price You Can Afford

STORAGE PROTECT INTERVAL TIMER

Available For Your Model 30

1401 FEATURES

See How & Get 1401 Features
including 1406 Model Changes

Contact: R. E. D. Corp.

COMMA CORP.

1240 Broadway, N.Y. 10010
(212) 724-7290



if it's
a matter
of speed

ROYTRON

Speed, in I/O
devices, is directly
related to price.

That's why we offer
you over 60
ROYTRON Models.
Pepar Tepa and
Edge Punched Card
Punches rated at 50,
500 and 1000 cps.
Readers rated from
1 to 1000 cps.

The lower the speed,
the lower the price.
So, why buy more
speed than you
really need?



For more information
call Frank Malwitz
DEM Products
(201) 566-2220

L DEM PRODUCTS DIVISION
LITTON
Automated Business Systems
600 Washington Avenue, Cliffside Park, N.J. 07012

Give your processor the punch it needs! Documentation's new P100 Card Punch. Our P100 features the reliability, ease of operation, and economy that have made Documentation's card readers the Standard of the Industry.

Side friction picking—cam driven punching—automatic data verification—simple interface—full TTL logic—straight line card travel—and more. They're all here in our new P100 Card Punch.

You get hopper after hopper of error-free cards. Our large capacity hopper and stacker (1000 cards) lets you load and unload on the fly. Punches at the rate of 100 cards a minute or 300 cards a minute when fewer than 10 columns are punched.

The P100 Card Punch. Like our card readers—it's gotta be great!

**II DOCUMENTATION
INCORPORATED**

POST OFFICE BOX 1240
MELVILLE, N.Y. 11747
TELEPHONE: (516) 724-3201
THE 110-864-2306

*
**the card
handlers**

Model/Feature	IBM Rental	NVC Lease
20601	\$22,983.00	\$9,600.00/mo.
6980		Min. 18 months
6981		
6982		
10527		

Avail: January 5, 1973

Under IBM Maintenance
Rate, Call Collect, No Deposit
Write or Call Collect — Today
It's our only business

WVC COMPUTER SALES, INC.

Route 618, Benjamin Franklin, Pennsylvania, Pa. 14630
(412) 687-7343

COMPUTERS NEED
U.C.P.*

*UNINTERRUPTIBLE COMPUTER POWER

SYSTEM 700 U.C.P. PROVIDES

- VOLTAGE CONTROL
- FREQUENCY CONTROL
- TRANSIENT CONTROL
- LINE CONDITION
- BRIDGES UTILITY POWER INTERRUPTIONS



Get the facts on
UNINTERRUPTIBLE COMPUTER POWER

Call Frank Wood (701) 355-2823

CS CONTROLS

POWER SYSTEMS & CONTROLS, INC.

P.O. BOX 3738 • RICHMOND, VIRGINIA 23261



A Novar 5-10 or 5-60 tape terminal, a Novar 5-10 Touch Tone Telephone Translator, and a telephone company's 403-type data phone are all that's required for a complete data collection station. Receives and records data inputs, for computer processing, from Touch Tone telephones, nationwide. Twenty-four hours a day service too!

GTE INFORMATION SYSTEMS

2370 Charleston Road
Mountain View, California 94040
(415) 966-2272

Terminal Picture Cloudy as Sycor, Computer Terminal and Data 100 Report

Sycor Inc. reported record revenues for the third quarter, while Computer Terminal Corp. ended the year with 40% more in sales, but a third terminal firm, Data 100, saw its third-period loss increase with revenues.

Sycor third-quarter revenues reached \$3.8 million, compared with \$1.8 million last year. Earnings, including a \$1.2 million tax credit, were \$275,100 or 12 cents a share compared with a \$557,400 or 43 cents-a-share loss in the year-ago period.

The nine-month period also showed a considerable jump around, with revenues of \$9.9 million, up 83% from the \$5.4 million last year. Earnings, including a \$220,000 tax credit, rose to \$434,300 or 17 cents a share compared with a loss of almost \$1.5 million or \$1.11 a share in the year-ago period.

Sales to the export market and the planned expansion of domestic marketing have contributed equally to the increase in revenues.

Nickels & Dimes

Consumer Marketing and Real Estate Services is expected to contribute about 80% of Comshare & Software's 1972 profits, and almost two-thirds of revenues, according to President Norman E. Friedmann.

Record earnings are expected in the fourth quarter, which will be sufficient to offset the 15 cents-a-share loss accumulated to date, he said.

Shipments of the 7330 disk drive system and returns from the packaged lease program are important factors in the upturn, he said.

Comshare's financial and DP service activities are growing in pre-tax income at a rate of better than 50% per year compounded, Redfield noted.

Computer Products had its fifth consecutive profitable quarter, with record revenue orders and backlog for the period ended Oct. 1. Earnings reached \$119,469 compared with a loss of \$68,384 a year ago.

Software International posted its fifth consecutive year of profitable operation.

Core production capacity at Data Products more than doubled fiscal 1972 and is being doubled again in fiscal 1973.

Planning Research has obtained \$12 million of long-term re-financing with a group of institutional investors.

Com-Share had a larger operating profit in the first quarter ended Sept. 30 than in all of the preceding year. Earnings, including a \$62,000 tax credit, totaled \$123,473 compared with a loss of \$104,288 in the year-ago period.

Sold Out — A 279,383-share secondary public offering of Computer Automation Inc. common was snapped up at \$13.25 a share.

Rockwood Computer's DP leasing operation incurred a loss in the six months ended Sept. 30. Although the unit reduced the amount of equipment off rent, it experienced lower rates in remarketing this equipment.

its production and shipping levels.

Date 100 reduced its losses for the second consecutive quarter, but the third-quarter loss totaled \$1.3 million or 64 cents a share, including a \$200,000 special charge. It compared with \$1 million or 82 cents a share in the 1971 period.

Revenues rose to \$2.7 million compared with \$1.1 million in the year-ago period.

In the nine months, revenue surged to \$6.4 million from \$2.4 million a year ago, while the loss totaled \$4.7 million or \$3.05 a share compared with \$3.1 million or \$2.67 a share in 1971.

Under an agreement for sales to Randolph Computer Corp., Date 100 will be entitled to 10% of gross receipts as sales and "on this basis we expect to be profitable starting in the quarter ending Dec. 31, 1972."

Record Earnings Should Lift Itel

SAN FRANCISCO —

Undaunted by a nine-month loss of \$2.6 million and amortization by the original third-quarter earnings of \$323,000, Itel Corp. President Peter S. Redfield is predicting 1972 will be profitable.

Record earnings are expected in the fourth quarter, which will be sufficient to offset the 15 cents-a-share loss accumulated to date, he said.

Shipments of the 7330 disk drive system and returns from the packaged lease program are important factors in the upturn, he said.

Itel's financial and DP service activities are growing in pre-tax income at a rate of better than 50% per year compounded, Redfield noted.

In addition, the sale of the Office Products Division has stripped the decks of our major money loser," as well as contributed about \$20 million to the kitty, he said.

In the quarter, revenues declined to \$23.1 million from \$25.5 million a year ago, while earnings climbed to \$232,000 or 3 cents a share from \$77,000 or 1 cent a share.

The nine-month revenues also dropped to \$62.7 million from \$81.1 million, and the loss totaled \$2.6 million or 35 cents a share compared with \$3.3 million or 46 cents a share in the year-ago period.

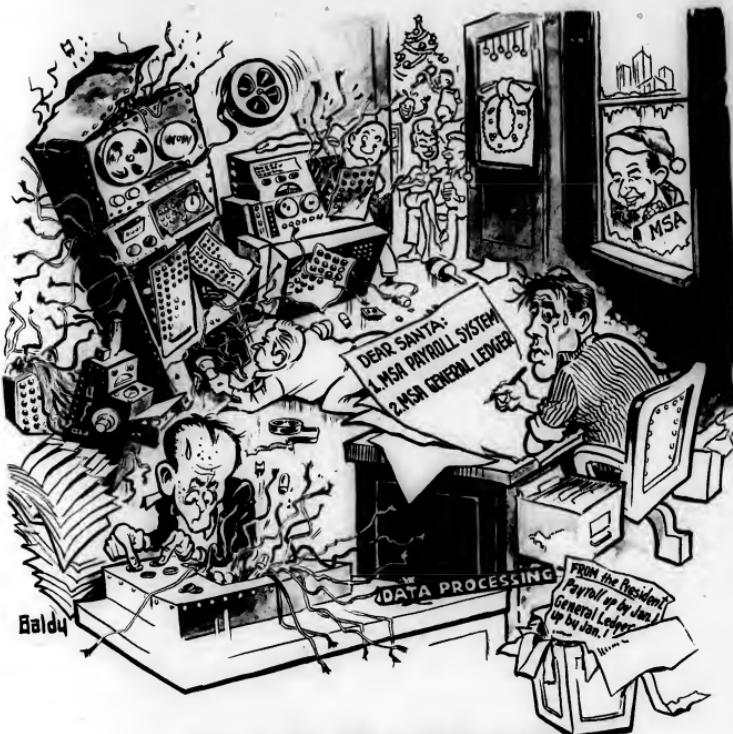
The 1971 results were restated to show separately the results of discontinued operations.



The Novar 5-10 Touch Tone Telephone Translator makes it possible to use the millions of Touch Tone phones around the country as remote keyboards for data entry. One has simply to call a Novar data collection station (of which the 5-10 is a part), enter information by using the phone's 12 keys, then sign off by hanging up the phone. A quick, easy, inexpensive way to a nationwide network.

GTE INFORMATION SYSTEMS

2370 Charleston Road
Mountain View, California 94040
(415) 966-2272



Joy to the World

MY NEW YEAR'S RESOLUTION: "Unlike 1972, 1973 is the year I will consider applications software packages. Rather than spending hundreds of man-hours of programmer's time reinventing the wheel, I'll use them more productively and save money by sharing development costs with hundreds of users."

**THANKS TO OUR 400 USERS FOR A GREAT 1972.
BEST WISHES TO ALL FOR THE HOLIDAY SEASON AND 1973.**

Dear Santa, Please send me information on the following packages:

FINANCIAL INFORMATION AND CONTROL SYSTEM
 GENERAL LEDGER AND RESPONSIBILITY REPORTING
 PAYROLL-PERSONNEL
 FIXED ASSETS

ACCOUNTS PAYABLE
 INVENTORY CONTROL
 INSTALLMENT LOANS
 TIME DEPOSITS

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

COMPUTER _____

TELEPHONE NUMBER _____

MANAGEMENT SCIENCE AMERICA, INC.

ATLANTA

3445 Peachtree Road, N.E.
 Suite 1300
 Atlanta, Georgia 30326
 404/262-2378

CHICAGO

15 Spinning Wheel Road
 Headstone, Illinois 60521
 312/323-5940

SAN FRANCISCO

525 University Avenue
 Suite 1220
 San Francisco, California 94101
 415/328-3700

NEW JERSEY

580 Sylvan Avenue
 Englewood Cliffs, New Jersey 07632
 201/871-4700

Los Angeles

1900 Century of the Stars
 Suite 2300
 Los Angeles, California 90067
 213/277-9411